

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

UNITED STATES OF AMERICA,

Plaintiff,

v.

CASE NO: 1:20-CR-24

MUSTAFA DEVILLE REYNOLDS,

Defendant.

* * * *

CONTINUED DAUBERT HEARING

* * * *

BEFORE: THE HONORABLE PAUL L. MALONEY
United States District Judge
Kalamazoo, Michigan
August 16, 2021

APPEARANCES:

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1 Kalamazoo, Michigan

2 August 16, 2021

3 at approximately 9:12 a.m.

4 PROCEEDINGS

09:12:31

5 THE COURT: This is File Number 20-24; The United
6 States of America vs. Mustafa Reynolds. This matter is
7 before the Court this morning on a continuation of a hearing
8 started earlier on July 23rd regarding the defendant's
9 motion to exclude cell-site analysis.

09:12:53

10 The record should reflect that Assistant United
11 States Attorneys Alexis Sanford and Dan McGraw represent the
12 government; Attorneys Tilton, Fisher, and Celis are here on
13 behalf of the defendant; the defendant is present in person.

09:13:11

14 The Court is ready to proceed. Mr. Tilton, I
15 believe you have a witness.

16 MR. TILTON: Yes, your Honor.

17 THE COURT: All right.

18 MR. TILTON: Your Honor, defense calls Dr. Vladan
19 Jovanovic.

09:13:15

20 (Dr. Jovanovic appearing remotely via
21 teleconferencing.)

22 THE COURT: Dr. Jovanovic, it's necessary for you
23 to take an oath. Would you raise your right hand, sir.

24 VLADAN JOVANOVIC,

09:13:36

25 was thereupon called as a witness herein, and after having

1 been first duly sworn to tell the truth, the whole truth and
2 nothing but the truth, was examined and testified as
3 follows:

4 THE COURT: The record should also reflect that the
09:13:40 5 witness is testifying via ZOOM by stipulation of counsel.

6 Mr. Tilton, you may proceed.

7 MR. TILTON: Thank you, your Honor.

8 DIRECT EXAMINATION

9 BY MR. TILTON:

09:13:48 10 Q. Good morning, Dr. Jovanovic.

11 A. Good morning.

12 Q. Could you please tell me what your profession is?

13 A. I am an electronic engineer --

14 Q. One moment, please. One moment here, please. We are
09:14:11 15 trying to get a little more volume.

16 THE COURT: Let's start again, Mr. Tilton.

17 MR. TILTON: Thank you.

18 BY MR. TILTON:

19 Q. Dr. Jovanovic, we are going start that over.

09:14:24 20 Could you please state your profession for the
21 record?

22 A. I am an electronic engineer.

23 Q. And in this case, did you prepare an affidavit?

24 A. I did.

09:14:41 25 Q. And is that affidavit notarized from the 11th of

1 August, of this year?

2 A. I believe it is notarized, probably 11th, right.

3 Q. And does the affidavit include your resume as well?

4 A. It does.

09:15:04 5 Q. Could you describe some of your background, educational
6 background, and relevant work experience?

7 A. I got a Bachelor's my Master's and PhD degrees from the
8 University of Belgrade in Yugoslavia. Over there I worked
9 for about ten years on developing the mobile -- digital
09:15:36 10 mobile radio systems pretty similar to second generation
11 cell mobile radios, except they were in the shoe box size at
12 the time.

13 In 1991, I moved to North America. I first got
14 employed by University of Toronto as a research associate.
09:16:03 15 I've stayed there almost two years. I worked on several
16 projects there, but biggest one and most famous is the
17 propagation -- radio frequency propagation measurements in
18 the field. The paper we wrote about that was cited about
19 more than 200 times in various books, other papers, even
09:16:37 20 patents and so on.

21 I believe in '93 I got employed, found job at Bell
22 Mobility Cellular, that was a cellular operator in Canada,
23 in Ontario and Quebec. I stayed there for -- until '95 or
24 so, '96, sorry, I'm looking at my resume. I'm not too good
09:17:04 25 with the numbers.

1 When I went to another cellular operator company,
2 which is PrimeCo Personal Communication, which is now part
3 of Verizon Wireless. I worked there in various managerial
4 positions and ended up being director of systems in radio
09:17:26 5 frequency engineering.

6 After PrimeCo, that was in 2000, I started working
7 for Lucent Technologies, which is maker of the -- I'm sorry,
8 the printer here is on. Okay.

9 So I started working for Lucent, which is a
09:17:56 10 manufacturer of the equipment that cellular operators use,
11 so I am pretty familiar not only with the field, but
12 equipment, how that equipment is made. In the process of
13 that I worked extensively with call detail records, even in
14 PrimeCo, but in Lucent, big part of my work was related to
09:18:24 15 call detail records.

16 In 2007, I left Lucent to become a CTO of Newfield
17 Wireless, which is, at that time it was another small
18 start-up company that was -- its main product -- it had
19 services related to radio frequency drive testing and
09:18:51 20 calibration of the radio frequency propagation prediction
21 tools. But most of my time there was devoted to the
22 development of a software that allowed for cellular
23 operators to map their calls based on call detail records,
24 which is geolocation of calls. I was responsible for
09:19:16 25 practically all geolocation algorithms there.

1 And since about 2007 or early 2008, I became
2 consultant, independent. I was engaged for several
3 companies, I worked as a consultant for, including Newfield
4 Wireless, too. I retired in 2017, but it is still semi
09:19:47 5 retirement. I'm doing some consulting work on and off in
6 the last four years.

7 Q. So you've been involved in various radiofrequency and
8 cellular positions since at least 1991?

9 A. I was since -- Yes, '91. I worked with radiofrequency
09:20:17 10 equipment, I was making radios since 1991, but cellular
11 either equipment makers or operators that use that equipment
12 since '93, I believe.

13 Q. Do you hold six U.S. patents?

14 A. I do.

09:20:38 15 Q. And what is the general category of those patents?

16 A. They are all in cellular engineering. In particular,
17 maybe not majority of them, but at least three are related
18 to various problems with handoffs when mobile change off
19 from one cell to another. So three of these patents are
09:21:11 20 related to the handoffs.

21 Q. Have you ever authored any publications in any
22 technical journals?

23 A. I did, yes. I have over 30 published papers, mostly at
24 IEEE a journal for electronics engineers in their journals,
09:21:37 25 which are probably the most esteemed in the field.

1 Q. And have you been retained by my office in this case?

2 A. I was.

3 Q. And are you being paid \$250 an hour?

4 A. That is correct.

09:21:57 5 Q. And have you worked about 30 hours on this case?

6 A. I believe so, yes.

7 Q. What information have you reviewed in preparing for
8 this case?

9 A. I had transcript of the first part of this hearing. I
09:22:18 10 had raw data files provided by various operators, and I had
11 files produced by TRAX tool that provide mapping and Google
12 Earth.

13 Q. This case involves TRAX and its founder, Sy Ray, has
14 testified. Prior to working on this case, were you familiar
09:22:51 15 with TRAX and Sy Ray?

16 A. I was familiar. There was one case in State of New
17 York. It's a case where I was retained by the defense. I
18 basically wrote a report about TRAX presentation that was
19 done, and appeal actually consulted with me during the trial
09:23:25 20 itself, but they contact me in the middle, I couldn't really
21 provide much help not given any of the data. There was an
22 enormous amount of data, but I prepared a report about TRAX
23 presentations specifically.

24 Q. And when you prepared --

09:23:45 25 A. There was --

1 Q. Oh, excuse me.

2 A. Sorry.

3 Q. When you prepared your affidavit in this case, did you
4 incorporate some of your past work and research you had done
09:23:55 5 about TRAX?

6 A. I did, yes.

7 Q. And are your -- Sorry, I didn't mean to cut you off.

8 A. Yes. There were at least two other cases I can think
9 of. There was a case in California, I believe it was State
09:24:15 10 of California against Charles Merritt where Mr. Ray produced
11 one of these KMZ files, and I prepared a lot of stuff about
12 that. But prosecution, they didn't use those exhibits at
13 that trial. And third time was -- I was retained by the
14 public defender in Rochester, and I prepare a big report,
09:24:54 15 parts are included in this one. That case stopped, I
16 understand that some plea bargain was made, so case was
17 removed from the public defender's office, and I don't know
18 how the report was used.

19 Q. Are your --

09:25:15 20 A. If it was used.

21 Q. Are your opinions in this case consistent with your
22 opinions in those prior cases?

23 A. Absolutely.

24 Q. Now, you prepared an affidavit in this case which
09:25:30 25 included -- do you have that affidavit in front of you?

1 A. I can open it in a second. Give me just a second, I'm
2 sorry.

3 (Pause in proceedings.)

4 THE WITNESS: I have opened it.

09:26:14 5 MR. TILTON: Your Honor, I would move for the
6 admission of Defense Exhibit PP.

7 THE COURT: Any objection?

8 MR. McGRAW: No objection.

9 THE COURT: Received.

09:26:23 10 BY MR. TILTON:

11 Q. Did you also prepare a Power Point presentation in
12 advance of your testimony today?

13 A. I did.

14 Q. And do you have that open in front of you?

09:26:38 15 A. I do.

16 Q. And that has been marked as Exhibit QQ.

17 MR. TILTON: I would move for admission of Defense
18 Exhibit QQ.

19 MR. McGRAW: No objection, your Honor.

09:26:50 20 THE COURT: Received.

21 MR. TILTON: All right.

22 BY MR. TILTON:

23 Q. Let's talk through that Power Point.

24 In the first section of your Power Point deals with
09:27:05 25 peer review of TRAX software. Has TRAX been subjected to

1 peer review?

2 A. I don't think it can be subject to the peer review in
3 usual normal sense, basically no communication describing
4 the methodologies have been used by TRAX to create the
09:27:28 5 exhibits have been provided to Court in this case nor in any
6 other case I was previously involved with. If your search
7 Google Scholar for any books, technical papers or patents by
8 Mr. Ray, they are none that I found documented in the
9 report. Searching Google patent search database didn't
09:27:55 10 reveal any patents assigned to that TRAX company. And on
11 the ZetX website, there are no write-ups provided by ZetX
12 personnel. They give some documents by other authors that
13 allegedly endorse the methodology, but nothing by ZetX.
14 There is also no peer reviewable data analysis the
09:28:24 15 statistical data analyzing to corroborate accuracy claims
16 that's available on the website or anywhere else that I am
17 aware of.

18 Furthermore, ZetX on their website claims their
19 mapping system is proprietary, and proprietary systems are
09:28:48 20 not peer reviewable by definition unless they are patented.
21 In telecommunications industry, proprietary can mean either
22 patent protected or company confidential. If it's not
23 patent, you can review confidential, you can't review that.
24 So in this case, I was basically forced to rely on
09:29:16 25 transcripts of the hearing and also on the information that

1 is available on the ZetX website about the TRAX.

2 Q. Based upon your experience in the radiofrequency and
3 cellular scientific communities, has TRAX generally been
4 accepted in those communities?

09:29:44 5 A. I am not aware -- Restate that, your Honor, I'm sorry.

6 Q. That was -- I guess we are not to that point, but
7 it's --

8 A. There is one of the slides later on where I address
9 that part. If you can jump to Slide 3 -- I'm sorry, I can't
09:30:11 10 see what is on the screen over there. Mr. Tilton, you work
11 through this. You tell me, you ask me questions about that.

12 Q. Let's talk -- we will come back to that.

13 There on Slide Number 4 refer to technical
14 references from the ZetX website?

09:30:45 15 A. That's correct. That's various writings they included
16 in there. There is none that they wrote themselves, but
17 there are two of mine. One is my C.V., which was put there
18 without any notification or permission from me, which I
19 found very unusual, and little bit concerning because my
09:31:12 20 home address at the time, you would expect that somebody
21 would ask. And there is also sample of the report by me,
22 and I would like to address some details later on.

23 I believe that contents of that report was
24 completely misinterpreted.

09:31:37 25 Q. Would any of your research or work support the -- what

1 Mr. Ray refers to as the horizontal plane or the way -- or
2 the TRAX software, the mapping?

3 A. No, I don't believe that anything in technical
4 literature on radiofrequency propagation supports that.

09:32:05 5 I've never seen that used in any RF engineering books,
6 technical papers, patents, anything like that.

7 I haven't seen that used in any tools that other
8 engineers use in their everyday work. You know, for mapping
9 or any propagation or any other tools or any of their
09:32:33 10 processes that they do in their everyday work.

11 Q. The ZetX website, above where your name and C.V. is
12 listed, lists four different papers, the first is project
13 Basta. Are you familiar yeah with that paper?

14 A. I am.

09:32:59 15 Q. Does that support the TRAX software in any way?

16 A. I don't believe so. That's basically a, called antenna
17 characteristics are to be defined as you go so on and so on,
18 it is not in the field.

19 Q. Next, the SWGDE recommendations for cell-site analysis,
09:33:26 20 is that supportive of the TRAX software?

21 A. I -- not in my opinion.

22 Q. And then we have the NIST, the N-I-S-T, guidelines on
23 mobile device forensics. Is that supportive of the TRAX
24 software?

09:33:44 25 A. No. I think it's very old document, probably before

1 TRAX was even available, and it shows actually the buyer
2 wedge on three or four pictures in there, not these antenna
3 horizontal patterns.

4 Q. And then in the final document is the IEEE transactions
09:34:10 5 on antennas and propagation, is that supportive of the TRAX
6 software?

7 A. I don't believe so. That's a journal, so unless you
8 have a journal and put the paper -- I mean journals don't
9 support anything, but I'm not aware of any paper and
09:34:30 10 transactions and antennas in propagation or transactions of
11 communications or personnel communications or personal
12 communications magazine or communications magazine where any
13 of that -- any of this presentation matter was ever
14 mentioned, used or anything like that.

09:34:51 15 Q. In the next page of your Power Point presentation, we
16 will get to TRAX geolocations.

17 A. Yep.

18 Q. Do you believe that the TRAX geolocations are accurate?

19 A. Well, there are two types of geolocations that TRAX did
09:35:13 20 for this case, one is when for each call only sector
21 coordinates and azimuth are available in that such case TRAX
22 shows sectors estimate the coverage area and channel borders
23 based on an antenna pattern, which is unspecified. It
24 appears to be the same on all sectors independent of
09:35:42 25 actually. Of actualizing configuration. So you have quite

1 different patterns of antennas of 0120 to 40 and 0100 and
2 220.

3 And they are all same in -- for all sectors, the
4 same shape, they are just scaled to various sizes. That
09:36:12 5 type of presentation is used for all call records on AT&T
6 and some of the calls that were made on Verizon's network.

7 Verizon has special set of call records, which are
8 for LT. LT is long-term evolution, that's basically four
9 generation technology that are now advertising in such case
09:36:44 10 besides latitude, longitude of the sector and azimuth, they
11 also give a distance measurement. And in such cases, ZetX
12 shows an arc at the measured distance, size of the arc,
13 angle or length of the arc, if you want. It is not defined,
14 appears to be plus or minus 70 from the azimuth in all
09:37:18 15 cases, but I check only a few, so I can't be sure.

16 Nothing on the ZetX website or in their promotional
17 media talks about such presentation. They talk only about
18 the first type when distance is not available, and they go
19 into great length about was the right pattern to describe
09:37:49 20 the sector coverage this antenna overlay versus pie and
21 wedge that most other people use. FBI whenever I saw their
22 experts testify, they use pie and wedge, not antenna shapes.
23 Q. Let's talk about the two different types of
24 geolocation. The first, when we talk about antenna pattern
09:38:15 25 method, we are on Slide Number 6, are we talking about what

1 Mr. Ray refers to as the horizontal plane?

2 A. Yep.

3 Q. And that is not something that is accepted in the
4 community of scientists or practicing professionals in the
09:38:30 5 field of radiofrequency engineering; is that true?

6 A. Not only that it's not accepted, but Mr. Ray advertises
7 on his site that he is the only one who uses that method.
8 If you jump to Page 7, I think there is snapshot from the
9 website.

09:38:51 10 Q. And this is a -- Looking at Slide Number 7. This is
11 the --

12 A. Yep.

13 Q. This is something that you took off of a ZetX or TRAX
14 website?

09:39:03 15 A. That is correct. On August 6, I believe.

16 Q. And so outside of TRAX and Mr. Ray, are you aware of
17 any other scientists or group that uses this horizontal
18 plane?

19 A. I've never seen it in any book, paper, patent. I've
09:39:27 20 never seen it used in -- by cellular operator in anything
21 they do, their RF engineers do.

22 And not only that I've never seen it, but
23 theoretically in the most ideal case, the sector coverage
24 shape is not like the antenna shape. And I have in the
09:39:59 25 report theoretical analysis that doesn't hold for one

1 isolated sector transmitted. It doesn't hold and you have
2 three sectors of antenna transmitting. It doesn't hold when
3 you have a bunch of other cells with three sectors
4 transmitting around the cell, they're never like antenna
09:40:21 5 patterns.

6 I also in the report -- and if you want, I put some
7 of these slides in the appendix here, if you get an idea
8 from there what they look like, and they are nothing like
9 that in real life.

09:40:40 10 Q. And so there isn't any scenario where this horizontal
11 plane would be an accurate representation of where a
12 cellular phone might be located?

13 A. I can't think of -- I mean, you know, you have millions
14 of sites, so there might be somewhere, you know, it can be
09:41:03 15 used, but for normal cell sites, normal networks, that's
16 just not what the sector coverage looks like.

17 Q. And talking about the horizontal plane, you've looked
18 at different planes or different horizontal planes before
19 this TRAX software update and after the software update?

09:41:37 20 A. I did, yes, I have some examples.

21 Q. And can you tell me, if anything, what you know about
22 whether or not the software was accurate prior to the update
23 or if it's more accurate after the update?

24 A. Okay. There are two aspects of accuracy, one is the
09:41:59 25 shape, which is all wrong; the other is the size. After the

1 update, I don't see any difference in the shape. It is as
2 wrong as it was wrong before. I see that there were
3 difference in shape sizes, and in some cases differences
4 were almost impossible to understand. The sector size were
09:42:30 5 the same input data increased 2.5 times, which is like six
6 times an area in distance, in the range, it increased 2.5
7 times which is like 6.25 times in area. And that same input
8 data, so it looks very weird.

9 Q. Let's talk about accuracy. There are various claims of
09:43:04 10 accuracy by Mr. Ray in the website.

11 A. That is correct.

12 Q. Let's -- let's start with Slide 39 in your Power Point.

13 A. Which slide?

14 Q. 39?

09:43:30 15 A. Okay.

16 Q. And is that -- on that page, does it say that it's --
17 and did you find this page somewhere?

18 A. Yes. It's from ZetX website. If you look in the upper
19 corner you can see the actual URL of the web page, so you
09:43:56 20 can see that is ZetX.com/TRAX, also accessed on August 6.

21 Q. And that claims it's 98 percent accurate?

22 A. That's what is on the website, yep.

23 Q. And have you heard of other claims of accuracy of --

24 A. I -- Transcript shows 95 percent during the
09:44:26 25 preliminary hearing. And I would like to emphasize here

1 that its accuracy in terms of mapping and ranging at the
2 hearing first part of the hearing 25 percent defined
3 different in terms of range, and mapping, it was defined as
4 the probability that phone would be in the area indicated by
09:44:54 5 TRAX. And this substantial different definitions I can
6 elaborate on that if you want, it's kind of technical.

7 Q. Let's first talk about the-- what accuracy or error
8 rate you believe, if you believe, that would apply to TRAX?

9 A. If you pull Slide 9, you have two successive calls.

09:45:30 10 TRAX normally shows sector estimates -- sector coverage
11 estimates individually as you progress call by call and
12 doesn't show where the neighboring cells are, so you can't
13 do any scientific check. But basically here, I just read
14 the time scale parameters so I show two consecutive calls

09:45:56 15 together. And if you look at this, this is something that
16 is theoretically and practically impossible in the field.
17 We have one sector which is completely encompassed within
18 the other sector. And both sectors cover distance between
19 these two cells is about -- cell, when I say cell, that's

09:46:24 20 probably what you would call cell tower, distance is
21 something I believe around 175 miles, and if you're 200
22 yards in front of one of these two, there is no practical,
23 no theoretical way that you can be talking to the other cell
24 that is 175 miles away. In the report I give the
09:46:56 25 calculation based on universally accepted model for

1 radiofrequency propagation in various environments, and I
2 believe if you're like 250 yards from one site, the site is
3 1.7 miles away would be received at five, 6,000 times less
4 power, so the chance that you will be connecting to that
09:47:22 5 farther sector is practically nil unless something broke
6 down. Cell is not operational or the antennas, you know,
7 there was a tornado, antennas broken down or something like
8 that.

9 So in the report, I also do a little bit of due
09:47:43 10 diligence that engineers would do in such a case. So I
11 analyzed the elevation pattern in between two geographical
12 variations of the terrain height. I looked at the terrain
13 morphologies, I looked at both sides there, how tall they
14 are, how high the antennas are. And based on that analysis,
09:48:14 15 the hand-off area would be -- as a fair approximation,
16 halfway between these two. They are at the same height
17 antenna, but they both propagate to the same signal,
18 suburban radiofrequency, so there is absolutely no way that
19 the borders can look like this.

09:48:34 20 Q. The due diligence that you are describing, is that in
21 Slide 31 of your presentation?

22 A. Just a second.

23 (Pause in proceedings.)

24 THE WITNESS: Yes. That is an example. I drew the
09:48:51 25 in Google Earth, I drew the line in between two cell towers,

1 and on the bottom part of the picture you see the ground
2 elevation and you see that there is actually a ridge in
3 between, and it's very likely that both cells are -- will be
4 covering up to that ridge, you know, and not past that ridge
09:49:22 5 in the direction away from them.

6 The next slide also shows what RF engineers
7 normally do in such cases. They look at the, in Google
8 street view they look for the actual cell towers and
9 antennas and try to see, you know, if there is anything
09:49:46 10 unusual, if one is 300 feet and the other 30 feet which
11 would also change the propagation on the ground. You see
12 that both are roughly of the same type and height. So those
13 are kind of things that they would look for. And they would
14 also look if there are any tall buildings, natural
09:50:08 15 obstacles, you know. To make the point, you know, if you
16 have an Empire State Building along this part, then it would
17 change how the radio signals would propagate, but there is
18 basically nothing on this part that would suggest that there
19 is substantial difference in signals that would come from
09:50:35 20 both of these sites. The radiofrequency waves go to pretty
21 much the same environment in terms of the electromagnetics.

22 BY MR. TILTON:

23 Q. So based on these errors and a review of the materials
24 for this case, do you believe that a 95 percent accuracy
09:50:55 25 overstates the accurateness of TRAX?

1 A. I believe that both 95 and 98 overstate. And you can
2 think of that as distance being accurate with error of two
3 or five percent or whatever happens to be, that can't be the
4 case. And if you look at Slides 10 and 11, you'll see an
09:51:25 5 example. And if it's meant to be that sector borders are
6 accurate 95 or 98 percent of the sectors, that also can't be
7 true.

8 Q. You talked about a second way that TRAX attempts to
9 geolocate calls, and those were the arcs?

09:52:10 10 A. Okay.

11 Q. And that is Slide 13 in your presentation?

12 A. Okay.

13 Q. Can you talk about the accuracy of that method and how
14 TRAX uses it?

09:52:25 15 A. Okay. That was referred during the hearing as time
16 difference of arrival method, which is wrong. It's not time
17 difference of arrival. It's time of arrival. If time
18 difference of arrival, you would have to draw comparables
19 around cells, not circles. And time of arrival is usually
09:52:47 20 reserved for case when you have more than one measurement.
21 When you have only one measurement, that's called in cans
22 sell I.D. method. That method is known and generally
23 accepted. It is described in the literature in
24 geolocations.

09:53:05 25 Q. Oh, could you speak a up a little, please.

1 A. There is specific reference book on geolocation that's
2 over thousand pages. It talks about -- they say nothing
3 about the antenna patterns on the ground. For example,
4 there is another book that discusses, I also listed in the
09:53:37 5 report that discusses the incident time of arrival. It's
6 normally accepted and described the literature as I
7 mentioned; however, the accuracy stating during the hearing
8 in July, whenever it was, 23rd, are not correct. The errors
9 are not within 17 meters as a conservative estimate, as the
09:54:07 10 Court heard. It's actually measurements of the distance are
11 in the units of 78 meters. So you are -- The report at 78,
12 156, three times 78, and all of that, that is called
13 resolution technique. But there are errors behind -- there
14 are rounding errors caused by using this unit which comes
09:54:34 15 from the noises marked by propagation and several other
16 sources.

17 I was able to find one public domain paper that
18 reports the accuracy results by looking at those distance
19 measurements versus distance measurements versus distance
09:55:00 20 obtained by GPS measurements on the test mobile, and they
21 find out that in five percent of the measurements, errors
22 are higher than 169 meters and on the average and in
23 unfavorable RF environment, five percent of the measurement
24 errors are over 280 meters plus or minus. And they find
09:55:30 25 that one-third of the measurements is -- has error margin of

1 78 meters on the average and larger than 150 meters in
2 unfavorable situations, so I thought that 70 meters is
3 conservative estimate is a little bit of a misstatement.

09:56:02 4 Q. Now, when you were looking at the arc, you also -- and
5 I'm looking at your Slide Number 16 -- did you also find
6 that certain information was missing from the Verizon CDRs?

7 A. I'm sorry, which slide number are you referring to?

8 Q. Slide Number 16?

9 A. Yes. If you can jump back to 14.

09:56:28 10 Q. Okay.

11 A. So there is -- I made this plot, but that plot's very
12 similar to what was in one of the original government
13 exhibits. You would probably recognize it. So there is a
14 call at 4:17 p.m. on the phone number that you can see on
09:56:57 15 the screen that is attributed to Tower 228-501. When you
16 look at the actual call data records, you will see that it's
17 on cell 501 in market, with the market identity 228, so TRAX
18 abbreviates that to 228-501, nothing problematic here, but
19 when you go and check the Verizon site table that they
09:57:26 20 provided with their files, you can't find --

21 And let me just -- on that Slide 14 you see at the
22 top that it's ERLT report, that means that report for LTE
23 technology on Ericsson equipment. If you jump now on
24 Slide 15 and look up for site Number 501 in the Verizon site
09:57:52 25 table, which lists all of the sites in the area, so on and

1 so on, there is no market I.D. 228, and there is no cell 501
2 which supports Ericsson LT equipment vendor, that would be
3 in the right most corner under vendor, and channel type
4 would be LTE. However, the coordinates of the site are
09:58:20 5 actually very close to the coordinates that TRAX show. So
6 it's possible that they assume because 501 cell is on this
7 other technology located at that cell -- at that location,
8 that is where the LTE cell if Ericsson equipment will be
9 located too. But that's an assumption which might be true
09:58:49 10 or might not be true, which I can't be sure has been
11 disclosed to the Court.

12 And then on Slide --

13 Q. Go ahead.

14 A. On Slide 16, if you look at the site coordinates that
09:59:11 15 Verizon site table -- cell-site table shows, and locate
16 where the TRAX software puts the site, the location is not
17 identical. The difference is under four decimal points or
18 something like that. That is probably few yards difference,
19 but it's not identical, which is very weird, because it
09:59:37 20 cannot be a type because that explains they upload site
21 tables automatically and it can't be around in there both
22 are shown at six significant digits. So the only
23 explanation I can think of is that TRAX used some other site
24 table, not the one that Verizon provided.

10:00:04 25 Q. So to create those arcs, TRAX used data that was not

1 contained within the Verizon CDR?

2 A. I believe so, yes. I have no other explanation how
3 they would put this site in slightly different location. On
4 Page 17, you have the location of their site. And if you
10:00:29 5 compare with coordinates on Slide 15, you see that that is
6 not the same thing. I have no other explanation except they
7 use some other site table.

8 Q. So let's go to Slide 25.

9 A. Okay.

10:01:13 10 Q. Now, when you use the best server coverage, is that --
11 and this is Slide 25 and 26. Can you tell me about that?

12 A. I can. In the field, sectors overlap, and TRAX made in
13 the original presentation and on their website, they make
14 that point repeatedly, and that's a valid point. But in the
10:01:47 15 field, the mobile would go normally connect to the site that
16 it sees as the strongest. So even when the two sectors
17 overlap, mobile would talk to the cell which has stronger
18 signal, particularly at the stronger level. So in
19 engineering, the borders between sectors are normally
10:02:20 20 depicted by best server coverage maps, not by individual
21 sector coverage maps.

22 And if you actually jump on Slide 23, I have an
23 example using model on flat terrain, ideal environment,
24 everything. What the sector coverage would look like, and I
10:02:44 25 have overlaid the antenna that was used in that example.

1 And you see that even isolated sector coverage doesn't look
2 anything like its antenna patterns. And Slide 24, I give
3 the mathematics of that which would show that it would be
4 highly nonlinear in various directions. And you can't just
10:03:06 5 scale the pattern. And then Slide 25 shows you how the best
6 server areas would look like when more than one sector is
7 available, and you see that it's again nothing like the
8 antenna patterns.

9 If you go to Slide 27, when you have surrounding
10:03:27 10 sectors and perfect grid and the sense that all cell towers
11 are at equal distance from their neighbors, then you get a
12 hexagonal pattern for those of us old enough to remember
13 early days of mobile cellular telephony, many cellular
14 companies had those hexagons in their logos, you could see
10:03:53 15 on their stores and stuff like that. That's where they come
16 from.

17 And then if you go further, I have examples for
18 what the real best server maps look in the field and how the
19 sector borders between cells on different same tower and
10:04:15 20 between sectors and different tower, what they look like.
21 And again, that is nothing like the overlay antenna
22 horizontal patterns.

23 Q. All right. And then I would like to go back to
24 Slide 19 to your conclusions.

10:04:38 25 A. If you will permit me, I feel very obliged to say

1 something about my Slide 18.

2 Q. Yes. Go ahead.

3 A. Okay. Two of those papers that are posted there I

4 mention my C.V., that I'm still very upset that it appeared

10:04:59 5 there without my permission, and in the shape it appeared

6 there. But that ZetX website also gives my report, which is

7 alleged that -- it's alleged that it endorses ZetX, and I

8 have some examples in the slides, in the backup slides. I

9 don't believe that anything in that report endorses TRAX

10:05:40 10 approach. I believe that it's grossly misrepresentation. I

11 believe, if anything, the stuff that was quoted from there

12 endorses the opposite, the pie shape, if it endorse any

13 particular shape.

14 It was also claimed that the hearing that I used in

10:06:01 15 my testimony, the frequency horizontal planes in earlier

16 case, Mr. Ray referred to those shapes as amoeba shapes.

17 That allegation that I used that in my work is completely

18 false. I never did that in or out of court. I will never

19 endorse throwing some unspecified antenna pattern on the

10:06:26 20 ground as a valid representation of sector coverage, no

21 matter what proprietary algorithm is used to scale those

22 patterns.

23 What bothers me even more is that Mr. Ray testified

24 that he is aware of my reports were advocated, see the

10:06:49 25 enclosed. On his site, that is the first case I mention,

1 Clayton case. He said that he reviewed that 100 percent,
2 and I am in the report affidavit. I mean it's blatant that
3 I didn't endorse his method. I didn't consider them
4 scientifically correct, and I considered them highly
10:07:15 5 inaccurate. And I, you have in the backup slides the
6 excerpts from the affidavit there. In that report there are
7 numerous examples of the impossible shapes and size of the
8 sectors. The fact that my name is used on that ZetX website
9 and in their promotional video as somebody who endorses that
10:07:44 10 is beyond my comprehension.

11 It's also inaccurate that I testified mainly for
12 defense attorneys. I testified seven or eight times for the
13 prosecution, only once for the defense. I have bunch of
14 cases where I worked for district attorneys that were
10:08:07 15 settled out of court after my exhibits were sent to the
16 defense. It's just beyond my comprehension what was going
17 on on the ZetX site and what was said during the hearing.

18 Q. All right. Well, now I would like to move to Number 19
19 to, back to your conclusions. And is it your conclusion the
10:08:36 20 TRAX mapping tool methodologies and algorithms cannot be
21 peer reviewed?

22 A. That is correct.

23 Q. And that the TRAX mapping tool methodologies and
24 algorithms are not generally accepted in the relevant
10:08:51 25 scientific community?

1 A. That is also correct.

2 Q. And that the technology itself contains a number of
3 errors?

4 A. It shows in the case when those amoebas are shown, it
10:09:12 5 shows impossible or just wrong estimates of both sizes and
6 shapes. When it shows the distance measurement target
7 generally acceptable in the scientific community in the
8 books, papers and all of that, but the accuracy claims are
9 exaggerating the accuracy. And what is really bothersome is
10:09:42 10 that it seems that some -- I have no other explanation that
11 some -- that some other cell-site table was used that was
12 not disclosed to Court or some assumption about the Verizon
13 site table were used that were not disclosed.

14 Q. And then finally, drive testing is not an accurate way
10:10:08 15 to test the TRAX methodology, is it?

16 A. Drive test can be used to measure -- to test their
17 methodology. Using drive tests to train the tool is
18 completely different thing. So if you take some drive test
19 and try to figure out kind of sector best servers area and
10:10:39 20 kind of borders based on drive tests, you have very hard
21 time for several reasons: One is that -- main reason is
22 that a normal sector simply don't carry enough radio routes
23 to get the proper estimate; and secondly, the mathematics of
24 that is very involved.

10:11:01 25 The company I worked for organized their own drive

1 test data, Newfield Wireless company, and based on those
2 drive tests data, they tweak the RF propagation tools that
3 almost all cellular operators in U.S. and some abroad use
4 and I'm very familiar with the mathematics involved in that.
10:11:28 5 That is very serious business. However, once you have a
6 sector coverage estimate, you can drive and test whether
7 your estimates are correct along these routes, that you
8 could drive the radio routes going away from the sector, so
9 in that case they can be used. Or it can be useful.

10:11:52 10 Q. Thank you.

11 MR. TILTON: May I have one moment, please, your
12 Honor?

13 (Pause in proceedings.)

14 MR. TILTON: Nothing further, Dr. Jovanovic. Thank
10:12:03 15 you.

16 THE COURT: Mr. McGraw, you may inquire.

17 MR. MCGRAW: Thank you, your Honor.

18 CROSS EXAMINATION

19 BY MR. MCGRAW:

10:12:07 20 Q. Good morning, sir.

21 A. Good morning.

22 Q. You've been hired by the defendant in this case to
23 review call records and data files associated with those
24 call records that are relevant to this case; is that
10:12:31 25 correct?

1 A. That is correct.

2 Q. And according to your affidavit on Pages 1 and 2, you
3 reviewed records provided by Verizon Wireless and AT&T for
4 four different telephone numbers, correct?

10:12:45 5 A. I believe, yes.

6 Q. And the KMZ files that can be displayed in Google
7 Earth, you also reviewed that data as well; is that right?

8 A. That is correct.

9 Q. And the transcript from the hearing on July 23rd?

10:13:02 10 A. That's also correct.

11 Q. But you're also aware that defense counsel has had
12 access to the TRAX software program for approximately a
13 month or so?

14 A. I was not aware.

10:13:18 15 Q. You were not aware of that?

16 A. No.

17 Q. But presumably that means defense counsel could have
18 generated those KMZ files just like Detective Heikkila did
19 using TRAX; isn't that right?

10:13:33 20 A. If they had it, probably, I mean.

21 Q. And as the defense expert in this case, you could have
22 done the same thing with access to TRAX?

23 Are you still there, sir?

24 A. Oh, sorry. I could have, but I have the files that
10:13:53 25 TRAX generated itself. I'm not sure why would I generate

1 the same files myself.

2 Q. Well, you would do that to test the accuracy of it,
3 right?

4 A. I test accuracy by looking what the output is, and
10:14:08 5 there are two different files -- sets of files presented,
6 one before and after the update. I looked at both. I don't
7 understand why you would want me to -- I mean it's a
8 computer program, you put same input, you get same output,
9 right?

10:14:27 10 Q. You could take those outputs that the software puts out
11 and you could compare them to other data that you have
12 available to yourself, right, network surveys or drive test
13 data; is that fair to say?

14 A. I was not provided any drive test data, I don't believe
10:14:43 15 that any drive test data was provided by prosecution. If it
16 was, defense didn't share with me, so I had no drive test
17 data to compare.

18 Q. I believe you testified on, during your direct
19 testimony that the drive test data is one way that could be
10:15:07 20 used to test this methodology. I think that was your exact
21 quote, "it can be used to test this methodology." That's
22 right?

23 A. Yes, that's right.

24 Q. Okay. And repeatedly we heard during your direct
10:15:20 25 testimony that 95 to 98 percent accuracy is wrong, but

1 someone with your education and background should be able to
2 take the data that is provided to you and come up with some
3 other accuracy figure; is that right?

4 A. That would take like a year. You have to --

10:15:42 5 Q. But you could do it?

6 A. Hundred sectors for each one to do the analysis of the
7 sort I do along each line; that is, I mean you can do it,
8 but I don't know --

9 Q. You can do it and you didn't do it in this case; is
10:15:55 10 that right?

11 A. I did it in my particular example, which was blatant,
12 and obviously wrong. I didn't do it for each and every
13 sector, no, I did not.

14 Q. Well, let's look at Page 9 of your slide show. You
10:16:13 15 discuss calls 121 and 122 for the Verizon phone number
16 ending 5505 (sic. 5055). What were the dates and times of
17 those calls? I don't see that on your slide.

18 A. I don't see -- I can find that. I think that's
19 contained in the report.

10:16:33 20 Q. Well, that would be important information to include,
21 wouldn't it?

22 A. It's included in the report. If you read the report,
23 I'm pretty sure that you will have dates, times and
24 everything.

10:16:47 25 Q. Are you referring to your affidavit?

1 A. I can scan the report probably faster than you can.

2 Q. I'm sorry, sir, are you referring to the affidavit you
3 filed in this case?

4 A. Yep.

10:17:00 5 Q. Maybe we can circle back to that after.

6 Are you looking in your affidavit right now?

7 A. I am trying to find it. I'll look yet, but I can pull
8 the file and we can read it live from the presentation.

9 Those are calls 121 and 122 in TRAX presentation. TRAX will
10:17:31 10 give you times if you want to see them.

11 Q. Okay. I'll move on. We will look in your affidavit
12 for that additional information.

13 A. You will see the TRAX file, KMZ file. Open it, select
14 121 and 122.

10:17:56 15 Q. I bring it up because I think during your direct
16 testimony you were trying to make a point about how, you
17 know, it's theoretically and practically impossible for
18 these two calls to be mapped the way they are, but we don't
19 know the dates and times of that call based on the slide
10:18:11 20 that you created.

21 A. Sir, I can, while you're doing this, I can pull the KMZ
22 and read that for you if that's a problem.

23 I can -- I am under oath, I'm telling you that
24 these are calls 121 and 122 from the TRAX presentation. At
10:18:28 25 this point, I can't find the date and time, but --

1 Q. Sure. Let's move on to the RTT data that you address
2 just briefly on Pages 14, and more importantly Page 40 where
3 you cite the RTT positioning field performance paper. Do
4 you recall that?

10:18:48 5 A. Okay. You want me to jump to Page 40?

6 Q. Well, I just want you to confirm that that was the
7 paper that you were citing as the basis of your testimony
8 today, at least as it relates to RTT data.

9 A. That is correct.

10:19:03 10 Q. Correct?

11 A. Yes. That is correct.

12 Q. That's a paper from September of 2010?

13 A. It's a paper from September of 2010 in the IEEE
14 Transactions on Vehicular Technology, that's paper on
10:19:21 15 general on mobile communications.

16 Q. Approximately 11 years ago?

17 A. That is correct.

18 Q. Fair to say this technology develops pretty quickly
19 over time? Eleven years is a long time in this field; is
10:19:37 20 that fair to say?

21 A. Eleven years is long time, but the accuracy, the
22 regularity of the measurements didn't change since 2010,
23 it's still 78 meters. And the noises and multi-propagation
24 effect don't change. That's not equipment-related, that's
10:19:58 25 the nature of the radiofrequency propagation in the field.

1 Q. And you're familiar just generally with a couple
2 radiofrequency engineering concepts that was discussed
3 during your direct testimony, the term pie shape or pie
4 wedge as it relates --

10:20:19 5 A. Yes.

6 Q. -- to sectors of a cell tower or cell-site? You're
7 familiar with that?

8 A. I am familiar with that.

9 Q. And you're also familiar with the terms "horizontal
10:20:28 10 plane" and "vertical plane;" isn't that right?

11 A. I am familiar with horizontal and vertical plane.

12 Q. I want to confirm a few things from your affidavit and
13 your testimony today.

14 First, Paragraph 26 of your affidavit: To the best
10:20:45 15 of your knowledge, "the antenna radiation pattern, no matter
16 how scaled, was never used as an accurate depiction or even
17 an approximation, of the sector coverage and handoff areas -
18 no matter how scaled - in any books on RF engineering and RF
19 signals propagation." Is that accurate?

10:21:05 20 A. That is accurate.

21 Q. And Paragraph 33, "To summarize, also for the record, I
22 never did, nor I ever will endorse throwing of some
23 unspecified radiation patterns on the ground as a valid
24 representation of the sector coverage, no matter which
10:21:23 25 mysterious algorithm is used to scale them." Is that also

1 accurate?

2 A. That is accurate.

3 Q. Now, just a quick aside. If you had the algorithm that
4 TRAX uses, you would be able to map and test the accuracy of
10:21:38 5 that software program; isn't that right?

6 A. No. I would be able to say if it has any basis in
7 science. To test the accuracy, we would have to either test
8 it against RF propagation prediction, maps, or drive
9 testing, or maybe some third way.

10:22:03 10 Q. Sure. It sounds like you answer -- you answered my
11 question a different way. You could test the reliability or
12 the accuracy of the TRAX software, correct?

13 A. It could be tested. You asked about algorithms, if I
14 move the algorithm, I could tell you why it's wrong or why
10:22:21 15 it can't be right, and what are the exceptions and all of
16 that, but algorithms are not disclosed, so I can't tell.

17 Q. The last paragraph in your affidavit, Paragraph 50,
18 that I wanted to bring up, "Showing the antenna radiation
19 pattern in dB units as a covered area of a sector has no
10:22:37 20 basis in science." Is that an accurate statement?

21 A. That is an accurate statement.

22 Q. So based on your testimony today and the affidavit,
23 it's pretty clear you don't believe antenna radiation
24 patterns can be used to approximate sector coverage or
10:22:54 25 handoff areas; is that correct?

1 A. They are one of the many two dozen factors that came --
2 that play into determining the coverage, sector coverage and
3 border area throughout using them as the estimate. And I
4 don't know how you would use vertical pattern for estimate
10:23:16 5 of anything. It is not based on science.

6 Q. You've previously been provided what has been marked as
7 Government Exhibit 100 by Mr. Tilton; is that right?

8 A. I don't know what you're referring to, sir.

9 Q. Did Mr. Tilton email you an exhibit that's been marked
10:23:40 10 Government Exhibit 100? It's your, the report you drafted
11 in September.

12 A. Oh, yeah, yeah, yeah. Yeah, I have that, sorry. You
13 mentioned the number. I didn't know what you were referring
14 to.

10:23:51 15 Q. I apologize. It's the September 2018 report that you
16 drafted titled "Geolocation of Calls in the Charles Merritt
17 case in California."

18 A. Yeah, yeah, yeah, I got that.

19 Q. You drafted that?

10:24:05 20 A. I have that available on the site, yes.

21 MR. MCGRAW: And I would move to admit that at this
22 time, your Honor, Government Exhibit 100.

23 MR. TILTON: No objection.

24 THE COURT: 100 is received.

10:24:15 25 MR. MCGRAW: Thank you, your Honor.

1 By MR. McGRAW:

2 Q. Let's turn to Page 19, the last paragraph on that page.
3 You write, "In figure --"

10:24:27

4 A. Can you give me just a moment to pull that document
5 out?

6 Q. Absolutely.

7 A. Okay. Page --

10:24:46

8 Q. Page 19, the last paragraph. And we are going to move
9 on to Page 20. But starting on Page 19, you write. "In
10 Figure 15, which depicts the radiation patterns of a typical
11 cellular antenna, we see that in this range of vertical
12 angles the antenna transmits largely outside its main
13 radiation lobe." Correct?

14 A. That is correct.

10:25:01

15 Q. And then if we turn to Page 20, we see Figure 15 at the
16 bottom of that page, right?

17 A. That is correct.

18 Q. On the left, that is a horizontal plane of a radiation
19 pattern, correct?

10:25:18

20 A. That is correct.

21 Q. And on the right, a vertical plane of a radiation
22 pattern?

23 A. That's also correct.

24 Q. And if we turn to the appendix on Page 36, we see

10:25:36

25 Figure 32, and you write, "In RF engineering theory, it is

1 well known that radiation pattern of any antenna when
2 expressed in units of decibels, dB for short, can be very
3 well approximated by the so-called parabolic curve." Isn't
4 that correct, sir?

10:26:00 5 A. That is correct.

6 Q. You go on in the subsequent paragraph to say, "Based on
7 the approximation and the known antenna azimuths from the
8 cell-site table, we can plot the radiation patterns of the
9 cell antennas that are next to each other on a cell site."

10:26:15 10 Is that right?

11 A. Very, very well, yes.

12 Q. So generally speaking, Dr. Jovanovic, you would agree
13 that using call detail records from wireless service
14 providers, based on the approximation and known antenna
10:26:31 15 azimuths, you can in fact plot radiation patterns of
16 cell-site towers?

17 A. That is not what this is saying, sir.

18 Q. But you would agree with that?

19 A. I wouldn't agree with that because that is one of two
10:26:48 20 dozen factors that determines coverage. It's not just --
21 it's antenna height, it's tower, transmit power, it's the
22 height, terrain elevation, it's RF, different -- very suburb
23 and urban, open field, and all of that.

24 Q. If I'm understanding you correctly, you would consider
10:27:15 25 a number of different factors when mapping radiation

1 patterns of cell-site towers; is that right?

2 A. I generally don't map radiation patterns of cell-site
3 towers. In this example, in this case, there is one example
4 where I mapped as a pie shape, not this amoeba thing, an
10:27:45 5 area of the handoff, and I estimated the size of that pie
6 shape based on due diligence that's demonstrated in this
7 report. I looked at the elevation, I looked at the antenna
8 height, I looked at whether -- it was in the desert, so that
9 didn't come into play and all of that. So I never used
10:28:08 10 antenna pattern to estimate the coverage.

11 Q. Fair to say, I think in that answer you said you would
12 have mapped it using the wedge shape or the pie shape; is
13 that right?

14 A. No, I -- that was an example of hand-off overhead area
10:28:26 15 where I go further on next Page 33 and 34, I explain how you
16 can determine the area of handoff, angular size of the area
17 of handoff, and I estimated the length on the ground based
18 on the geography and elevation maps and antenna heights and
19 all of that.

10:28:54 20 Q. I understand.

21 A. I never draw --

22 Q. Go ahead.

23 A. I never put antenna patterns to represent the coverage
24 of the sector.

10:29:06 25 Q. You certainly disagree -- You certainly disagree with

1 the conclusions that have been drawn in the TRAX software
2 for how it maps cell phone coverage or handoff areas; is
3 that fair to say?

4 A. I disagree because they are wrong.

10:29:25 5 Q. Okay. And you would do it entirely differently, but it
6 is possible to map that type of data, right? Considering
7 all of the factors that you've just discussed, it's possible
8 to do that?

9 A. It's possible there are tools, I have propagation tools
10:29:42 10 which have been admitted to evidence in previous cases where
11 you take 20 or 30 different parameters for the mobile for
12 the cell, you get terrain elevation database, you get RF
13 plot data based on satellite measurements. These are
14 software programs, thousands of dollars that cellular
10:30:04 15 operators use to design their network, and they use them
16 even when the network is underground and nobody -- if this
17 method works, you throw the antenna pattern and you scale it
18 without heights and terrain morphology and any other
19 information about the cell site, all of these guys would be
10:30:29 20 out of business by now.

21 Q. And this was the type of prior work that you did, I
22 think it was for Newfield Wireless in 2007; isn't that
23 right?

24 A. I did various things there, yes. I was engaged in
10:30:44 25 geolocation project, and people who formerly reported to me,

1 some of them at least were engaged in drive testing to
2 calibrate those propagation tools, but that line of business
3 was not very smoothly, so I didn't really contribute much to
4 that part of the Newfield business.

10:31:08 5 MR. McGRAW: Thank you very much, sir. I having
6 nothing further.

7 Thank you, your Honor.

8 THE COURT: Mr. Tilton.

9 THE WITNESS: Mr. Tilton, can I -- Actually you
10:31:27 10 can't give me permission. Your Honor, can I have three
11 minutes? I need a bio-break at this point.

12 THE COURT: We will give you ten, how about that?

13 THE WITNESS: That would be even better. Thank you
14 , sir, so much. I'm sorry.

10:31:38 15 THE COURT: All right. No, that's quite all right.
16 I call it a bio-break sometimes, too, okay.

17 We will take --

18 THE WITNESS: And my neck, and I take some muscle
19 relaxer dries me, makes me dry, my mouth, and I have to
10:31:57 20 drink water and then, you know.

21 THE COURT: Fair enough.

22 THE WITNESS: Thank you so much. I'll be back in
23 five. Thank you so much.

24 THE COURT: You are welcome.

10:32:04 25 We will take a 10 or 15 minute break. Thank you.

1 MR. TILTON: Thank you.

2 COURT CLERK: All rise, please.

3 Court is in recess.

4 (At 10:32 a.m., recess.)

10:50:04 5 (At 10:49 a.m., proceedings continued.)

6 THE COURT: We are back on the record in U.S. vs.

7 Reynolds. Counsel and the defendant are present.

8 Redirect, Mr. Tilton.

9 MR. TILTON: Thank you, your Honor.

10:50:14 10 REDIRECT EXAMINATION

11 BY MR. TILTON:

12 Q. Good morning again, Dr. Jovanovic.

13 On cross examination, Mr. McGraw asked you about
14 your affidavit in the Charles Merritt case. I would like to
10:50:36 15 have you look at your own slide show again in Defense
16 Exhibit QQ, on Slide Number 42.

17 A. I'm there.

18 Q. And is this an excerpt from your report, which is
19 Government Exhibit 100?

10:51:01 20 A. That is correct. Except that I add dotted red lines.

21 Q. So you believe that Mr. Ray misunderstood this report
22 or the TRAX software misinterprets it. Can you tell me how
23 that misinterpretation relates to what you have in
24 Footnote 26?

10:51:29 25 A. Okay. I think this is the crux of the problem and

1 probably the reason the questions were asked on cross, which
2 were supposed to kind of indicate some inconsistency versus
3 my old report.

4 I did write here that the sector borders and
10:52:01 5 overlap areas, I don't mention that here, but given the
6 overlap areas are defined by antenna radiation patterns,
7 these are horizontal radiation patterns, but that relates
8 only on an antennas on the neighboring sector of the same
9 tower.

10:52:22 10 Basically if you have two antennas, one shoots like
11 this, the other shoots like that, and there is a point in
12 the middle on this side, this sector will take over on the
13 other side, the other side will take over. And these
14 antenna patterns are precisely defined and they are steady.
10:52:42 15 But that applies only for the sectors that are borders
16 between sectors and the same tower.

17 Sectors between on cells -- on two different
18 towers, their borders are asymmetrical and they go zig-zag
19 any which way. The reason for that is in the normal cell
10:53:10 20 towers, all sector antennas are a few yards away from each
21 other. So when you are one mile away, you see all sector
22 antennas within an angle of 01 degrees or something like
23 that. So the propagation part obstacles, forest, trees,
24 everything on that part is the same. They are on the same
10:53:39 25 height, on the same antennas for the sector, are the same

1 tower. They are normally in the same heights and all of
2 that. So in that case -- in that case only you can use the
3 horizontal pattern to find the borders of the sectors and
4 overlaps between sectors and the same cell.

10:54:02 5 And I think that has been consistently
6 misunderstood or maybe even misrepresented because if this
7 endorses anything, it endorses the pie shape of both the
8 sector and the sector overlap areas and not the antenna
9 pattern, you know, of some amoeba form.

10:54:27 10 Q. Thank you.

11 Mr. McGraw also asked you whether or not you could
12 have performed an accuracy test on this software. Now --
13 Oh, go ahead.

14 A. He did. He did, yep.

10:54:44 15 Q. Now, if something is opened up, an algorithm or a
16 program, to the scientific community and subjected to peer
17 review, is that one of the things that might happen?

18 A. That's one of the things that might happen.

19 Q. And you said that it would take you, in your estimate,
10:55:06 20 at least a year to do an accuracy test?

21 A. I honestly don't believe the burden of proof is on me.
22 I was not aiming, you know, any specific numbers. I just
23 said these numbers don't make sense to me. I think burden
24 of proof is on those who make such statements. So you know,
10:55:30 25 present drive test data or whatever, geolocation, how many

1 -- where the border was in the map that I created versus
2 whether on the drive test mobile handed off and all of that,
3 and then do thousands of such measurements, and then you can
4 do statistics and say 93 or 98 or 10 percent. But I could
10:55:56 5 do it. I mean if somebody hires me, I can certainly do
6 drive tests myself, and I can do such comparisons.

7 Q. But that's something you would expect would be
8 subjected to peer review?

9 A. Yes. I mean you provide, you know -- this is raw data,
10:56:16 10 this is my statistic analysis, this is the results, you put
11 in the open and people can see if I made error in statistics
12 or if my drive test methodology wasn't good or something.

13 Q. So people with similar scientific backgrounds, such as
14 yourself, could review it?

10:56:35 15 A. That is correct.

16 MR. TILTON: Nothing further, your Honor.

17 THE COURT: Mr. McGraw.

18 MR. MCGRAW: No thank you, your Honor.

19 THE COURT: All right. Thank you.

10:56:42 20 All right. That concludes the testimony.

21 Mr. Tilton, do you have any other proofs?

22 MR. TILTON: We have no other proofs, your Honor.

23 THE COURT: All right. Thank you.

24 Rebuttal?

10:56:55 25 MS. SANFORD: Your Honor, the government briefly

1 re-call Sy Ray.

2 THE COURT: All right. Thank you. And we have
3 Mr. Ray connected.

4 Mr. Ray, I'm going to swear you in again, so if you
10:57:10 5 could raise your right hand, sir.

6 SY RAY,
7 was thereupon called as a witness herein, and after having
8 been first duly sworn to tell the truth, the whole truth and
9 nothing but the truth, was examined and testified as
10:57:21 10 follows:

11 THE COURT: Ms. Sanford, you may inquire.

12 MS. SANFORD: Thank you.

13 DIRECT EXAMINATION

14 BY MS. SANFORD:

10:57:24 15 Q. Mr. Ray, I'm going to start by having you review some
16 of the slides prepared by Dr. Jovanovic. Do you have a copy
17 of those slides?

18 A. I do.

19 Q. I would like to start by looking at Page 4, which shows
10:57:37 20 a list of technical references from the ZetX website. And
21 Mr. Tilton --

22 A. Correct.

23 Q. Mr. Tilton went through this briefly. This is
24 references Project BASTA, the SWGDE recommendations for
10:57:50 25 cell-site analysis, there is a link to a technical journal.

1 Why did you include these things on your website?

2 A. So, we get a lot of questions in reference to using the
3 wedge shape, which was historically used for law enforcement
4 to map call detail records and then using the horizontal
10:58:09 5 plane. And what we have done over the years, because we
6 have had a number of these challenges throughout the
7 country, is we put a website together, and it's open to the
8 public, because we are putting this stuff out there. We
9 want people to be able to do some research on their own.

10:58:22 10 This horizontal plane, not only is actually accepted in the
11 scientific field, but it's published in multiple journals,
12 it's published in multiple papers. And I'm still confused
13 because Dr. Jovanovic said he's never used it, but he's
14 published it in his actual case work as well.

10:58:38 15 I'm not getting into the ranging side of it with
16 these reference points. What we are trying to say is that
17 if you are going to map these records, using a horizontal
18 plane is a better way to do it than the wedge shape.

19 And probably the most important thing, when it
10:58:54 20 comes to criminal justice, is it's exculpatory. The
21 horizontal plane actually makes the area bigger. And if you
22 look at some of the other slides in the appendix that Mr.
23 Jovanovic -- or Dr. Jovanovic included, you'll notice that
24 when he overlays the horizontal plane over some of the
10:59:10 25 sectors that he is representing was what kind of the more

1 accurate coverage should be. The horizontal plane is
2 actually bigger. That actually plays into that exculpatory
3 model that we are saying hey, yeah, we understand that a
4 center of the cone is likely where the device is at, but
10:59:27 5 there's other things that he didn't discuss such as
6 reflection. The fact that I could be bouncing off of a
7 glass building in a city be behind the antenna and still
8 connect. And we see this across the country on a regular
9 basis. And the problem we were having is that when we did
10:59:39 10 drive tests, and just for the record, to date we have
11 conducted drive tests on over two million cell sites. When
12 we have done that, we have never been able to put an exhibit
13 up on the map similar -- and just for reference so the Court
14 aware and kind of keep the record clear, I'm referring to
10:59:59 15 Mr. -- or Dr. Jovanovic's Slide Number -- give me just a
16 second here -- 27.

17 And you will notice on Slide 27 where he has the
18 cell cites, he has these nice clean pretty lines extending
19 from the cell sites showing that where one coverage stops
11:00:14 20 and another coverage begins. And he is right. I am really
21 confused about his report with Merritt, because he says in
22 Merritt that when you have cell sites that, or sectors
23 rather on the same tower, you can absolutely use the
24 horizontal plane to map those, even though he says it's not
11:00:32 25 scientifically feasible in other reports. But when you look

1 at his Slide 27, and I see these nice pretty straight lines
2 extending between the sectors, not only does that go against
3 common sense of radio frequency, it goes against the report
4 that he wrote in Merritt. And more importantly, we get back
11:00:49 5 to that exculpatory nature. If I'm going to err I want to
6 err, on the side of the defense. I want to make sure that
7 I'm including all possibilities for the defense. I'm not
8 going to actually shrink the coverage down.

9 And if we go back to Slide 4, the reason we include
11:01:06 10 the scientific working group on digital evidence -- and I
11 think it's section 7.2, if I remember correctly, they are
12 using the pie shape. And they explain that the pie shape is
13 the optimal coverage of a cell-site, but they also caution
14 using the optimal cell-site may not be the best advantage
11:01:28 15 and that you want to use something more in line with the
16 actual cell-site. So all of the pages, it's our comparison
17 of the pie shape to the horizontal plane and that we are
18 showing that we are actually covering a more realistic
19 overlay with the horizontal plane.

11:01:43 20 Q. And are you including the references to Dr. Jovanovic
21 here because you are saying he endorses TRAX?

22 A. I don't know that Dr. Jovanovic, especially after
23 hearing his testimony today, has enough knowledge to make
24 that endorsement. Even if he did, I would question it just
11:01:59 25 simply because when asked it he had access to it, if he

1 could test it, he was kind of hesitant. So, in no way am I
2 referring to Dr. Jovanovic as a peer review of TRAX, of a
3 peer review of the product. In none of this are you going
4 to see anything about me saying he endorses it. What I'm
11:02:16 5 saying he is a really smart guy, he's got a Ph.D. in
6 engineering, and he's generated reports using the horizontal
7 plane contrary to what he said earlier that he's never done
8 that, he has. It's in black and white.

9 I will agree with him -- I am confused, I'm sure
11:02:31 10 most of the Court is confused as well -- where he is saying
11 he's never used these, but in the report he very clearly
12 describes that he has used it.

13 When we actually say somebody endorses TRAX, we
14 will put enough TRAX to that person. We allow them to
11:02:48 15 conduct a peer review, we allow them to actually publish the
16 results, and we have done that in the past contrary to what
17 Dr. Jovanovic said.

18 Q. So what was the significance of the Charles Merritt
19 case and why is that included in these reference materials?

11:03:03 20 A. So the Charles Merritt case occurred after the Thomas
21 Clayton case, and it wasn't about what Dr. Jovanovic was
22 going to testify to in the Merritt case. I actually agree
23 with his report. I agree with his findings a hundred
24 percent. I don't have any issues with Dr. Jovanovic's work
11:03:21 25 on the Merritt case. The problem is similar to this case,

1 in the Clayton case, which happened before the Merritt case,
2 Dr. Jovanovic said very clearly that using radiation
3 patterns, horizontal plane, whatever you want to call it,
4 the amoeba shape, has no place in science. And he was
11:03:40 5 actually really mean to me in his affidavit where he really
6 called out the fact that I just simply don't have the
7 training, I don't have the education, and that the way that
8 I'm mapping these records has no place in science. And then
9 lo and behold, about a year later, he generates a report
11:03:54 10 where he is using a horizontal plane. I was contacted by
11 the San Bernadino D.A.'s office on that case, to very
12 similar to this case right now, offer rebuttal testimony in
13 the event that Dr. Jovanovic was to testify to talk about
14 the Clayton case and how he made these assertions, if you
11:04:12 15 will, during the Clayton case, that you can't use this style
16 of mapping.

17 And again, just to make sure we are all on the
18 record and making sure we are talking about the same cases,
19 the Clayton case has been reviewed all the way up to the New
11:04:23 20 York State Supreme Court of Appeals, and it's been upheld.
21 So that was a really big deal with the Merritt case. Isn't
22 what his findings were, but to show kind of how he's gone
23 back and forth with some of his statements.

24 Q. I would like to flip now to Slide 9 on his
11:04:37 25 presentation, which is titled by him "Impossible Sector

1 Shape and Size Estimates by TRAX." Do you have that slide?

2 A. I do. I'm looking at it now.

3 Q. It's unclear to me what is being depicted here. What
4 is this slide showing?

11:04:57 5 A. Well, it's showing two phone calls. And if we were to
6 open up the Verizon call detail records, we could go to Row
7 121, we could see where the first call is being made, which
8 is the one on the right, the smaller shape that's inside the
9 bigger shape. And in the second one is 122. And there is
11:05:12 10 two issues here that, somebody of Dr. Jovanovic's experience
11 and background should absolutely understand the importance.
12 These are two separate phone calls. In no way is that
13 possible to happen at the same time. What is being
14 represented on the map right here that's missing is the
11:05:29 15 duration of time between the two calls.

16 We are not saying that the phone connected to both
17 of these cell sites at the exact same time and that now
18 somehow this is flawed. What we are saying is that 121 --
19 call 121, the phone connected to a cell-site, and due to
11:05:44 20 other cell-sites in the area, this is the estimation we have
21 based on our drive test data around the country and
22 algorithm. Whether it's a few seconds, a few minutes, an
23 hour later, the phone then connects to the cell-site
24 represented here by 122. Without knowing that time, there
11:06:00 25 is really nothing to discuss here about the accuracy.

1 And I can probably clarify, too, that there was an
2 elevation profile in association with that that was listed
3 on Slide Number 31.

4 The problem with this elevation profile, and it
11:06:18 5 actually really shows why that second one is so much bigger,
6 is Dr. Jovanovic actually just drew a line between the two
7 cell-sites and showed an elevation profile. He didn't draw
8 lines along the azimuths of those cell-sites to see how the
9 elevation profile matches in different areas. For example,
11:06:37 10 if we go back to the slide you were just referring to, which
11 is Slide 9, the range that's bigger, the reason that one is
12 bigger is that there is actually an incline to what you're
13 looking at here, to the left of that black line that extends
14 from the cell-site, which is the azimuth, and there is areas
11:06:56 15 to the left that absolutely could be covered by that
16 cell-site.

17 And then on the smaller one, the problem there is
18 that you have some other cell-sites directly in front of
19 that azimuth line across the river.

11:07:07 20 In TRAX, the algorithm we use, which I did describe
21 in original testimony, takes into account where cell-sites
22 are positioned directly to or within or outside of that
23 azimuth line.

24 Q. Thank you.

11:07:23 25 Now, looking at Slide 15 of his presentation -- and

1 really I kind of want to refer to Slides 15 and 16. This
2 cell-site 228-501, he says that -- he doesn't know where
3 that's coming from. Were you able to locate that cell-site?

4 A. Yes. So I should probably start by pointing out some
11:07:55 5 glaring issues here. Number 1, on Slide 15, if you look at
6 the P column, P as in Paul, and it gives you the channel
7 type -- I'm not going to get crazy technical here, but
8 basically notice that that's all 1xEV-DO or 1xRTT Traffic.
9 We are mapping an LTE site, and we are looking at a 3G, 2G,
11:08:17 10 or in some cases potentially even a 1G cell-site list.

11 So Number 1, I haven't seen the bigger cell-site
12 list, but the screen shot here in no way represents, nor is
13 it what I would look for, to identify the cell-site that he
14 is questioning, the 228-501, because it's an LTE site. We
11:08:35 15 need to look at the LTE site.

16 Now, I saw this, the issue with this about 15
17 minutes before the hearing, so I haven't had a lot of time
18 to prepare, but I did run some records. And we archive
19 everything that our system sees, and I can tell you that
11:08:49 20 cell-site 228-501, not the cell 501 with the market I.D. of
21 228, but the entire Number 228-501, we have had uploaded
22 into our system by law enforcement records directly from
23 Verizon 35 -- or I'm sorry, 32 different times. The first
24 time in 2016, the last time in 2020. We have also had an
11:09:12 25 upload from the FBI's database what they refer to as the

1 CALEA database, that also shows the cell-site. There's
2 absolutely no doubt that this is 228-508, we have seen it a
3 number -- or 501 rather -- we have seen it a number of
4 times. It looks like we've mapped it over 75 times since
11:09:30 5 2016.

6 And you know, the other piece of this, and I
7 checked this during the original testimony this morning, all
8 you have to do, and reasonably like Google Earth, is zoom
9 into the tower. You can see that the tower is located
11:09:43 10 there. You can actually go into street view and see the
11 entire tower. You can see how it's configured. You can see
12 what direction the antennas are pointing. So any time there
13 is a concern of hey, are we dropping this lat-long in the
14 right spot, it's as easy as zooming in and looking to see if
11:09:58 15 there's a cell-site there.

16 Q. Now, in his affidavit, Dr. Jovanovic makes some issue
17 -- takes some issue with the fact that you use TDOA versus
18 TOA. Can you talk briefly, explain to the Court what the
19 difference between those two terms is?

11:10:18 20 A. Yes. And I want to be very respectful here, and I've
21 said this in the video that he referred to earlier, I think
22 that Dr. Jovanovic is a very smart guy. I think he's done a
23 lot of great work with cell phone records. Obviously he's
24 very well educated in his field. I think what is happening
11:10:36 25 here is the lack of experience directly related to working

1 with multiple carriers' phone records in 2020 or 2021.

2 Yes, we can argue about the technical terms of TOA
3 and TDOA all day long. What Dr. Jovanovic probably doesn't
4 realize is even the phone companies have titled these
11:10:54 5 reports TDOA reports. There are certain reports of this
6 technology that when you open it, at the top of the page, it
7 actually says "TDOA."

8 And the other thing I think he's mistaken on is
9 when we get these reports, it is the cell companies
11:11:08 10 measuring the distance from the phone to multiple towers at
11 the same time. Now, a lot of times the reports that law
12 enforcement gets will only show one tower or the primary
13 tower's measurement. But it is the measurement of multiple
14 towers at the same time. There's a lot of Verizon reports
11:11:27 15 that we can actually go into the report, it's about 220
16 columns wide, and we can see where multiple cell-sites
17 connected to the cell phone in the same millisecond and
18 receive measurements, and that is absolutely what is called
19 TDOA.

11:11:43 20 So just for the sake of argument, when the phone
21 companies are calling it TDOA, the reports are actually
22 titled TDOA, we are going to call it TDOA.

23 Q. TDOA also what has been referred to in some of the
24 materials as RTT data?

11:11:57 25 A. A hundred percent.

1 Q. And so that is where we see -- in this instance, we see
2 a line from a tower with an arc showing the distance from
3 the tower to that phone along that arc; is that correct?

4 A. That is correct.

11:12:19 5 Q. Okay. I want to touch briefly now on two things that
6 we covered when you testified originally just to make it
7 clear now that Dr. Jovanovic testified.

8 First, you talked last time about a software update
9 and how that changed what TRAX was calculating as far as
11:12:38 10 handoff areas?

11 A. Correct.

12 Q. And we see in Slides 10 and 11 that Dr. Jovanovic
13 prepared a change in one of those handoff areas following
14 that update.

11:12:54 15 A. Correct.

16 Q. In fact, the area becomes much larger after the
17 software update.

18 A. That is correct.

19 Q. What is calculated differently now that we see this
11:13:04 20 change in results between this -- on this same call with
21 this same cell-site?

22 A. Prior to the update, which is Slide 10, we were looking
23 at towers individually. So we would look at a tower and we
24 would see how that tower is placed with other towers in the
11:13:21 25 area. And we were estimating a general coverage area based

1 on what we have seen around the country. The problem that
2 we saw or -- and we knew that was there, in certain
3 situations in this case the cell-sites to the north, the
4 cell-sites to the east of this tower that's represented in
11:13:41 5 -- on Slide 10 are really close to the cell-site. So when
6 you look at it that way, the coverage area looks like okay,
7 it would be small because there is a lot of other cell-sites
8 in very close proximation. However, when you look at the
9 azimuth of the cell-site and the direction it points, what
11:13:55 10 we found is there were no other cell-sites directly along
11 that azimuth line.

12 So Slide 10 represents when we were estimating size
13 just, based on tower locations and its proximity to other
14 cell-sites. We kind of had a breakthrough in all of our
11:14:09 15 drive test data -- and again, I'm going to agree with
16 Dr. Jovanovic where he said yes, he could peer review this,
17 but it would probably take him a year, and someone is going
18 to have to hire him, and he doesn't think it's his burden,
19 and I agree with that. And I think his year is a really
11:14:24 20 aggressive plan. It took us seven years, and we have done
21 millions of drive tests to do this. And what we have found
22 is, we can now calculate these sizes based on the sector
23 itself, but more importantly the azimuth of that sector and
24 how that correlates with other cell-sites in that area. So
11:14:39 25 in network planning, when we have gaps between cell-sites on

1 one side of the cell tower and we have other cell-sites very
2 close to the north side of the tower, we can now adjust for
3 that.

4 And again, I want to fall back to what I said
11:14:50 5 earlier, this is exculpatory. We have increased the size of
6 the coverage area. We're actually saying there is more
7 probability that that phone is in different areas than what
8 we used to. We want to err on the side of being able to
9 come into a hearing like this and say we feel very
11:15:05 10 comfortable, at this point 95 percent, that that phone is
11 inside the blue-shaded area at the time it connected to the
12 tower.

13 Q. When you say at this point 95 percent, you are talking
14 about after the software update?

11:15:16 15 A. That is correct.

16 And Dr. Jovanovic pointed out a -- on our website
17 where we have 95 percent, but if you will notice, there's
18 more to that statement on our website. We are talking
19 specifically cell-site mapping based on call detail records
11:15:30 20 from tower and sectors. We map a lot of other data, and in
21 all of other our data when we've ran tests, we do see that
22 98 percent accuracy. When we're talking specific to sector
23 data, and I thought I made that very clear in my original
24 testimony, it sits right about 95 percent.

11:15:47 25 Q. And before you were doing the analysis, looking at

1 sector data as opposed to just tower density in a certain
2 areas, what was your estimate of your accuracy? I think
3 from last time as I recall was over 80 percent accurate.

4 A. Yes, depending on the environment, rural, urban, yes,
11:16:10 5 we would be about 80 to 85 percent. So we found this was a
6 pretty dramatic increase.

7 Q. Now, Dr. Jovanovic testified on direct that proprietary
8 by definition means something is not peer reviewable. When
9 you say that TRAX is proprietary, do you mean it is not peer
11:16:32 10 reviewable?

11 A. No. That's not what proprietary means. Proprietary in
12 the business world means that if you take my algorithm and
13 you tried to copy it and you tried to sell it, I'm probably
14 going to sue you if you make money on that, because we spent
11:16:46 15 a lot of time and effort building it. Proprietary means we
16 own it.

17 We have released our algorithms. We have allowed
18 them to be peer reviewed. We have allowed them to be
19 published. There is another Ph.D. in the field, his name is
11:16:58 20 Filipo Sharevski. He actually has a cybersecurity Ph.D.
21 from Purdue, he is a current professor at DePaul. We opened
22 up our entire system, we gave him free access for over a
23 year. He tested our system, he wrote about our system in a
24 book, it's been peer reviewed. And his conclusion was for
11:17:15 25 both text message and voice CDRs as well as for packet

1 services. The TRAX tool also enables animated
2 representations of the service activity in place and time
3 which is a great feature for both analysis and
4 interpretation and courtroom evidence presentations. We
11:17:31 5 have been peer reviewed. We have had a Ph.D. crack open the
6 hood and actually look at how we are doing this stuff.

7 Q. I'm going to ask you to --

8 A. Just for the record to -- I'm sorry, I probably should
9 have named the book. The book is called Mobile Network
11:17:45 10 Forensics, Emerging Research and Opportunities.

11 Q. And I would like you do a favor for the Court Reporter.
12 Can you spell the name of that author?

13 A. Yes, and I probably butchered some of the pronunciation
14 and I apologize.

11:17:57 15 The first name is F, as in frank, i-l-i-p-o, and
16 the last name starts with S, as Sam, h-a-r-e-v as in Victor,
17 s-k-i.

18 Q. So if you're willing to tell what the algorithm is so
19 that it can be peer reviewed, can you briefly, and in
11:18:20 20 laymen's terms, tell the Court what your algorithm is? What
21 is the algorithm that TRAX uses to determine these handoff
22 areas?

23 A. I can. And in fact, if the Court will allow me to
24 share my screen, I can actually overlay it within a Google
11:18:39 25 -- in Google Earth and make it very clear to see.

1 Q. Will you do that, please?

2 A. Give me just one second.

3 Okay. Hopefully it's there. You should be able to
4 see Google Earth with Grand Rapids.

11:19:02 5 Q. Give it a second. Okay.

6 A. So I'm going to put one of our coverage overlays on the
7 map with the cell tower icon.

8 And earlier I was saying one of the reasons we
9 really like Google Earth is the ability to zoom in like
11:19:18 10 this. And if I remove that overlay that I just put in
11 there, we can actually see that this is a cell-site right
12 here that's located on the top of a football stadium. And
13 so whenever there is a question of hey, is that the correct
14 lat-long, very easily I can go down into street view and I
11:19:36 15 can actually look at this giant cell-site that's located
16 right on top of the lat-long that was given. So whenever
17 there is an argument that somehow lat-long is wrong, it's so
18 easy to confirm that there really isn't much reason to spend
19 any time arguing that.

11:19:53 20 But if we get into the algorithm -- and there's a
21 couple things that I'll put on the screen here. So what we
22 look at is other cell-sites -- and I apologize, I'm going to
23 have to load one other file here. I'm going to load all of
24 the Verizon cell-sites in Grand Rapids in this general area.
11:20:16 25 When I said earlier, you'll see gaps, you are going to see

1 the network planning. There is reasons to have a lot of
2 cell-sites in some areas and not so many cell-sites in
3 another area. And when you look at this particular
4 cell-site, you'll notice how right down the azimuth line,
11:20:32 5 that strongest line, there is a gap, and that's why we have
6 to extend that range a little further.

7 What we found after reviewing millions of drive
8 tests or data from millions of cell-sites from our drive
9 test scanner is we were able to kind of reverse engineer,
11:20:49 10 that if we took a cone, and a cone that looks basically like
11 this -- and I made it short -- but we can extend the cone 60
12 miles programmatically when we look at this. What I can do
13 with that cone is I can start to measure each cell-site or
14 the closest cell-sites that are popping up within that cone.

11:21:05 15 So this first one is at 1.72 miles. The second one
16 is at 2.64 miles. The third one is at 3.46 miles. We take
17 those and we average them. So in this case, if I average
18 them, the average is 2.6 miles. And then we have a little
19 model here, right now we are using .97. If we take the
11:21:27 20 average and we times it by .97, we get 2.52 miles. And if
21 we were to measure this distance right down the azimuth
22 line, it's at 2.52 miles. I have no doubt that you're going
23 to have people like Dr. Jovanovic say yeah, I don't know
24 that that's scientifically accurate, because you are talking
11:21:46 25 about a very academia, very sterile way of looking at

1 cell-sites.

2 What we are saying is when we go out into the field
3 and we take our cell-sites that we have mapped, you know, 2
4 million of them in the database at the time, we go out and
11:21:58 5 we get the RTT, the TDOA type records where I think we have
6 a database of about 25 million of them, and we start to do
7 an algorithm where we say hey, programmatically have we ever
8 seen a connection to this cell-site beyond 2.52 miles, and
9 the systems comes back and says, no, we've seen some about
11:22:15 10 2.5, we've seen one at 2.51, but we've never seen one beyond
11 2.52, that's how we get the accuracy rating. And we were
12 shooting for the mid to high 90s, so we started at like .92,
13 and we had some of that data coming back that it just wasn't
14 accurate, so we expanded it.

11:22:32 15 Now am I saying that this phone -- that this
16 cell-site literally covers everything that you have in the
17 shape here. That's not what we are saying. And I think
18 that's what Mr. Jovanovic is misrepresenting or
19 misunderstanding what our system is doing.

11:22:46 20 In 2021, there are cell-sites that cover 200, 300
21 meters. Like you go into a college campus, very small
22 coverage areas. You go to a rural location, and we have
23 mapped a connection and have actually been able to maintain
24 a voice connection at over 60 miles. So as an investigator
11:23:02 25 for court, for any other reasons, when it comes to the

1 criminal justice side of this, we have to be able to
2 represent the average size saying hey, there is a lot of
3 variables coming in here, elevation, tower height, just like
4 Dr. Jovanovic said. Water will have a big impact,
11:23:20 5 buildings, the reflection, of any type of trees, you know,
6 all of that stuff comes into play here. So what we do is we
7 look at the country overall and we say, is there some way we
8 can capture all of this. And if we're slightly big, so be
9 it, let's make sure that we cover that whole area. And
11:23:35 10 that's where these ranging data comes from.

11 There is a second piece to this. We also tell
12 people all the time, You can drive test this data. We own
13 drive test scanners, we send them out around the country, we
14 do a lot of drive testing. We store all of that
11:23:49 15 historically.

16 So there is ways to test it, it is not some secret
17 sauce that we keep behind closed doors that nobody can see.
18 I have explained this exactly what you see on the screen
19 here a number of times. And we encourage people to go out
11:24:04 20 and test it. If somebody goes out and tests it, and says
21 hey, we found some problems, that's great for us. It opens
22 the door for us to figure out better ways do it. And I have
23 no doubt that in the future we can improve upon what we are
24 doing now. But for the time being, we have found this is a
11:24:18 25 very accurate means to give law enforcement personnel

1 practitioners a very general way to estimate what that
2 coverage areas looks like.

3 Q. Mr. Ray, can you preserve a copy of that screen shot
4 that showed the algorithm and send it to me?

11:24:35 5 A. I can. Do you know what that number it would be?

6 MS. SANFORD: Yes, your Honor. I would like to
7 move to admit that as Exhibit 101 for purposes of the
8 record.

9 MR. TILTON: No objection.

11:24:44 10 THE COURT: Received. 101.

11 BY MS. SANFORD:

12 Q. I just want to finish with something I think you sort
13 of just addressed.

14 Dr. Jovanovic talked about a lot of things that
11:24:53 15 need to be accounted for when you're mapping cell-site
16 location information. Radiofrequency patterns is one thing,
17 but the antenna strength, the antenna height, elevation,
18 geography, whether it's a city or a suburb or an open plain,
19 all of those things. And what you are saying is TRAX
11:25:10 20 doesn't necessarily consider all of those factors in each
21 cell-site, but by it accounts for those with its error rate;
22 is that correct?

23 A. That is correct. And there is some easy ways that we
24 can misrepresent a handful of the things that we see in the
11:25:28 25 exhibits in the appendix that Dr. Jovanovic provided. And

1 you'll notice like -- and I'm looking again at Slide 27,
2 where he has very defined areas of like color where, okay,
3 this sector is going to cover this area. What we found in
4 drive testing, especially in 2001. And understand, drive
11:25:48 5 test data from 2010, drive test data from 2015 is very
6 different than what we see in 2021. With the 4G
7 technologies we see sharing between sectors and cells much
8 more frequently. There is no such thing as a clearly
9 defined pattern such as like our horizontal plane. There is
11:26:04 10 going to be holes covered by other cell-sites, but at the
11 same time, it can expand further in this case, that example
12 I gave was like two miles, so again, you can have a
13 cell-site, three cell-sites, four cell-sites providing
14 coverage to the exact same area. And we have to figure out
11:26:23 15 a way that we can actually present that when we are doing
16 our estimations. And over the years, looking at all of the
17 different cell-site data that we have gathered, this is the
18 best way we have found to do it. And it has been accepted
19 -- I get this question all the time: Has it been accepted
11:26:37 20 in the relevant scientific community? It's hard to define,
21 because is Dr. Jovanovic the best person to say he is the
22 relevant scientific community. Has he ever gone out in the
23 field and tried to find a mobile device based just off phone
24 records and nothing else? Has he gone out in the field and
11:26:52 25 tried to recover evidence? Has he gone out in the field and

1 tried to recover a buried body? We have done this thousands
2 of times, and we are accurate, we are recovering evidence,
3 we are finding bodies. And when we get this question: Has
4 it been accepted in the relevant scientific field, we have
11:27:08 5 had Daubert, Frye, Kelly, Shreck, you name the hearings
6 around the country, we have had them over and over again,
7 and it's been accepted time and time again in every state
8 it's been challenged. So yes, it has been accepted in the
9 relevant scientific field.

11:27:22 10 MS. SANFORD: I have no further questions. Thank
11 you, Mr. Ray.

12 THE COURT: Mr. Tilton, you may inquire.

13 MR. TILTON: Thank you, your Honor.

14 CROSS EXAMINATION

11:27:33 15 BY MR. TILTON:

16 Q. Good morning, Mr. Ray.

17 A. Good morning, sir.

18 Q. The software update we have talked about occurred in
19 April 2020?

11:27:50 20 A. Roughly, correct.

21 Q. You testified in other cases prior to April 2020,
22 right?

23 A. I have multiple times, correct.

24 Q. When you testified prior to April 2020, you claimed
11:28:03 25 that the accurateness of the TRAX software was above 90

1 percent correct?

2 A. If you give me which case, we can talk about that a
3 little bit more, but I've probably testified a hundred times
4 prior to that. So what case in particular are you
11:28:18 5 discussing.

6 Q. Let's start out, in those a hundred times where you've
7 testifying TRAX was more than ninety percent accurate?

8 A. There is no way I can give you a number of how many
9 times. The reason I'm asking this is I suspect that the
11:28:33 10 transcripts that you're reading from, if you gave me the
11 case, you are going to find that we did a drive test. So
12 this is different where a crime happens, we're contacted
13 early in the investigation, we go out and do a drive test.
14 We then take the forensic exam of the network from our drive
11:28:48 15 test and we compare it to the mapping that we created, and
16 now we can absolutely say it's 90 percent accurate, it's 92
17 percent accurate, it's 88 percent accurate. You are going
18 to find different variables around the country. The reason
19 I'm asking if you can give me a case, I need to know if we
11:29:02 20 actually did the drive test. And I suspect you're referring
21 to the Clayton case, and I can tell you in the Clayton case,
22 I personally flew out there and did the drive test myself,
23 so I was able to tell exactly what the accuracy was.

24 Q. In cases where there was no drive testing completed,
11:29:18 25 what would you have testified the accuracy would have been?

1 A. It depends on, again, what year. The other thing is do
2 we have some other corroborative data. What I mean by
3 corroborative data is, let's say that our suspect is using
4 an Android device and we have Google location data. So now
11:29:36 5 we can actually look at Google location lat-long, many times
6 within accuracy, and I can compare it to the phone records.
7 And now we have two different sources of data. I can say
8 Okay, we see this phone drive across Colorado and we have
9 these phone records, but at the same time, we have this
11:29:52 10 lat-long. There is times I may have told the Court it's a
11 hundred percent accurate. In fact, we have so many
12 different sources of data that are coming down in the exact
13 same area, it's mathematically impossible for it not to be
14 accurate. So again, when we talk general cases, you are
11:30:06 15 going to have to give me a case and what other supporting
16 data we had on top of TRAX.

17 Q. What I'm asking about is before you used any of that
18 corroborative data, what was the accuracy rate of TRAX
19 before April 2020?

11:30:24 20 A. Doesn't make sense. Without using corroborative data,
21 there is no way I can tell you what accuracy is. Whether
22 that corroborative data is, going back towards our drive
23 test database, whether that corroborative data is looking at
24 RTT, whether it's looking at Google. If you're asking me to
11:30:42 25 commit to the accuracy of prior testimony without looking at

1 corroborative data. The other thing I can tell you is it's
2 few and far between that I would ever testify to accuracy
3 without seeing corroborative data.

4 Q. So is the 95 percent rate that you are saying TRAX is
11:30:56 5 now accurate to after the software update, is that with or
6 without corroborative data?

7 A. So we are talking about two different things, and let's
8 make sure I'm super clear on this.

9 You are talking about my testimony and you are
11:31:10 10 talking about our cell tower database, so I'll break these
11 into two components.

12 Our cell tower database is maintained
13 programmatically, and what that means is we can
14 programmatically look at all of ranging we have associated
11:31:22 15 with ever sector in the United States, about 25 million of
16 them, and we can compare that to drive test data, we can
17 compare that to the TDOA data, and we can say how many times
18 do we see that a phone connects to a cell-site outside of
19 the range that we are predicting. And when look at it
11:31:40 20 programmatically within our cell tower database, it's
21 roughly at 95 percent. I think varies from month to month
22 because we get new cell-sites that come in, you know,
23 sometimes it could be 94.6, sometimes it might jump up to
24 like 96, but it's roughly 95 percent.

11:31:56 25 If you are talking about my testimony, that's a

1 whole different thing. My testimony is where I review a
2 case, I look at the data, and then I look at -- or
3 corroborative data if we have it, but I'll also start to go
4 in and I'll look at things like elevation, I'll look at
11:32:10 5 things like bodies of water, where do we have structures,
6 what does the, you know, the foliage in that area look like.
7 In this case, we have RTT data on top of the call detail
8 records, so there is some corroborative data just from the
9 RTT data alone that we can pull and I can look at here.

11:32:28 10 If you're asking me about accuracy statements in
11 court, many times that's going to be after I've done a full
12 analysis and looking specific to that case. 95 percent is
13 the cell tower database across the country. My testimony is
14 going to be specific to a case based on whatever information
11:32:42 15 and data is available for that case.

16 Q. Let's talk about this case specifically, because you've
17 testified -- this is your second time testifying, and the
18 data in this case was run both before the software update in
19 April 2020 and after the software update in April 2020,
11:33:02 20 correct?

21 A. The agency that ran it, correct. I did not run it.

22 Q. I couldn't -- we had a connection issue there, and I
23 couldn't hear your answer. Could you repeat the answer?

24 A. I believe the Grand Rapids Police Department ran the
11:33:20 25 data at those two time frames. I personally have not ran

1 the data for those two time frames.

2 Q. Do you know what the accuracy would be of the data that
3 was presented that was run through the TRAX program before
4 April 2020 in this case?

11:33:36 5 A. I don't know, and I quite honestly I wouldn't look at
6 it. I'm not testifying to that data.

7 Q. What about the TRAX data that was run after April 2020,
8 do you know what the accuracy is of that data?

9 A. I can tell you the accuracy that we have seen across
11:33:51 10 the country from the tower database is roughly 95 percent.
11 I can tell you that when I compare the RTT data to our
12 ranging data, we are hitting closer to 100 percent based on
13 what I have available to me.

14 And let me explain this to you so I don't lose you
11:34:09 15 on this. If I have a horizontal plane on the screen from a
16 phone call, and TOA data is different than phone calls. And
17 then I map 30 seconds after that phone hangs up, there is a
18 TDOA phone call, and I have the max range of the horizontal
19 plane at two and a half miles, but 30 seconds after that
11:34:26 20 call, there is a TDOA hit that is six miles away. That
21 would be an error rate, right, because I'm showing the voice
22 call within 2.5 miles, but Verizon is getting a measurement
23 showing it's six miles away. We can use that data to help
24 corroborate this data as well. Remember, we have multiple
11:34:45 25 layers of data. When we overlay them together in this case,

1 they line up. So you know, I'll never come to court and say
2 a hundred percent, because there is always things that can
3 be wrong, there's always flaws. I'm not seeing anything
4 that causes me any concern that the current data we are
11:34:59 5 talking about, the post update data, is inaccurate or that
6 we have issues with it or something that it cannot be relied
7 upon.

8 Q. So you have corroborated what was run in TRAX after
9 April 2020 in this case specifically?

11:35:15 10 A. Based on the information I have, yes.

11 Now I, with that said, I know nothing about this
12 case. I don't even know what the crime is, I don't know any
13 of the parties of the case, I don't know the known
14 information of houses and where maybe witnesses saw
11:35:30 15 different people. So just as long as everybody understands,
16 based on the information I have been given, yes, I have
17 corroborated it to the best of my ability.

18 Q. What information were you given?

19 A. The phone records.

11:35:45 20 Q. So you've only used the phone records to corroborate
21 what the TRAX software outputted?

22 A. And the accuracy of the phone records, yes.

23 Q. What would you normally expect that someone would use
24 to corroborate the TRAX output?

11:36:09 25 A. It depends on what you're mapping. We support over 850

1 different types of data. It's kind of a broad question.

2 Q. I'm talking about in the type of data in this case,
3 what could be used to corroborate it?

4 A. As I explained before, the TDOA. The RTT can
11:36:27 5 definitely help. I believe there is some AT&T NELOS that
6 could definitely help. And then I don't know what other
7 case specifics could be used. Maybe there is surveillance
8 video, there is an LPR reader, there is known information
9 about where a particular individual was seen. There is
11:36:44 10 other factors that could --

11 Q. How about a drive test?

12 A. Drive test could absolutely be used.

13 Q. And that's something you would normally would do?

14 A. Well, it's done. I can't say normally. You have to
11:36:59 15 understand we have 25 million sectors in the database.
16 There is a lot of crime in the United States. I don't know
17 that I can say that my drive test scanner can normally be
18 used to map all of those.

19 Q. I would like you to go to Defense Exhibit QQ, which is
11:37:15 20 Dr. Jovanovic's Power Point presentation?

21 A. I'm sorry, what number?

22 Q. We are going to go to Pages 10 and 11?

23 A. Okay. I'm there.

24 Q. And so my question to you is: Page 10 is a horizontal
11:37:36 25 plane that was created before the TRAX software update; and

1 Page 11 is a horizontal plane that was created after the
2 software update. Can you tell me what the accuracy of each
3 of those horizontal planes would be?

4 A. Well, I can't tell you the accuracy of the prior to the
11:37:56 5 update, because I don't have drive test data from that
6 specific sector to get into where it exactly falls. What I
7 can tell you is based on everything we have seen around the
8 country, I would say the accuracy, as I've been saying the
9 entire time, is around 95 percent on Slide 11.

11:38:11 10 And if I can share my scene again, I'll show you
11 how our system actually caught the network planning that
12 there is a big gap between cell-sites for that sector and
13 our system actually caught that, and that's why we increased
14 the size.

11:38:27 15 Q. I'm fine if you want to share that.

16 A. If you'll give me just a second, I've got to make sure
17 I get the actual site we are dealing with here.

18 Okay. I still have it listed as Exhibit 101. If
19 we need to change, let me change that before I publish just
11:39:06 20 so it's not confusing to anybody.

21 And let me know when you can see my screen.

22 Q. We can see it.

23 A. Okay. We are talking about this cell-site right here
24 the 228-548. And if you can't see that, what I'm going to
11:39:37 25 do is I'm going to draw a line extending from the cell-site

1 up to the north. You see there is an elevation profile that
2 came up underneath that there.

3 And what I want you to see is like there's a
4 cell-site right here that's basically half a mile away
11:39:55 5 north-northeast. There is a couple cell-sites kind of off
6 to the west, yes, the west-northwest. Those are about a
7 half a mile as well. Then you get a whole bunch right down
8 here in the downtown area. So hypothetically, if we just
9 start talking about how the coverage would look from
11:40:10 10 different antennas. Obviously to the west and to the north
11 of this cell-site, you are going to have smaller coverage
12 areas because of the approximation of other cell-sites.

13 Now, if we look at that particular sector that you
14 referred to, the azimuth is generally along the yellow line
11:40:27 15 here that I've marked. Notice the gap. So when we look at
16 the coverage of an antenna that's pointed to the west or an
17 antenna that's pointed to the north of the cell-site, common
18 sense says it's got to be smaller. We do a drive test, it
19 is going to prove that it has to be smaller. But when we
11:40:42 20 look at a cell-site that's positioned kind off to the
21 south-southeast, notice that that distance is almost, it's
22 1.5 miles, so we have gone almost, what, two and a half
23 times the distance of the other sites. And if I go back to,
24 or if we go back to Mr. Jovanovic's slide, I think he
11:41:03 25 estimated that we increased two and a half times. What that

1 tells me right off the bat is that is a form of validation
2 for me. When we look at hey, we are positioning these other
3 sectors at a half mile or less because of the environment
4 that we are seeing these cell-sites, but now we have
11:41:20 5 identified that this sector is pointing a direction where
6 there is a gap in other towers, and we actually see an
7 increase of two and a half times, I think that it kind of
8 speaks for itself there.

9 Q. Okay. So we are talking about, when that software
11:41:35 10 update occurred, we are talking about sort of a different
11 method, right? I think you said prior to 2020 we were using
12 sector and azimuth, and then that changed in 2020; is that
13 correct?

14 A. No. It's actually backwards. We were just looking at
11:41:51 15 the cell-site locations prior to that. Now we actually look
16 specifically at individual sectors and azimuth.

17 Q. It's a pretty significant change.

18 A. It was a major change for us, it was actually a really
19 good advancement for us.

11:42:07 20 Q. Now, you mentioned, you talked about peer review on
21 direct examination. And what does peer review mean to you?

22 A. Correct.

23 Peer review is when somebody who has training and
24 is educated in the field reviews a work product or some type
11:42:30 25 of an exhibit similar to this to simply review it and see,

1 you know, is there accuracies, is there anything missing, is
2 there something we need to expand on, is there further
3 investigation that's required. It can be a number of
4 different things.

11:42:42 5 Q. So you don't mean a peer review in the scientific sense
6 that it was published in a scientific journal?

7 A. If you can find me a peer review in a scientific
8 journal that explains how to review all of the evidence
9 within a homicide case to make sure that it was properly
11:43:00 10 aligned within call detail records and other types of
11 geolocation evidence, I would be more than happy to cite it,
12 but typically we are not in the business of publishing
13 things that could be used to actually commit crime.

14 So no, I'm not going to get into a public document
11:43:19 15 and explain how I can use evidence in a homicide to help
16 solve a homicide. That's common sense. We are not going to
17 peer review all of the different ways that we -- methods and
18 techniques we use to solve homicides in a scientific
19 journal. It's not the point for it. I don't even know if a
11:43:39 20 scientific journal would actually publish it, but I will
21 absolutely use other experts in the field, whether they are
22 an expert in homicide investigations, whether they are
23 experts in geolocation data, whether experts in cell phone
24 reports, and a lot of times I'll use multiples.

11:43:56 25 Q. You mentioned one source of scientific peer review,

1 that was Dr. Sharevski's book?

2 A. Correct.

3 Q. And Dr. Sharevski in his, is not -- he is a Ph.D., but
4 he is not someone who teaches about radiofrequency
11:44:17 5 propagation, correct?

6 A. Well, he is a professor at DePaul who specializes in
7 network communications, so I don't know what his syllabus
8 looks like, I don't know what his teaching capabilities look
9 like, but he has a Ph.D. and he is a professor at a well
11:44:33 10 known college, so I think it's possible he absolutely gets
11 into radiofrequency.

12 Q. But you don't know for certain?

13 A. I've never been to any of his classes, no. I know that
14 he reached out to us, because he was specifically interested
11:44:49 15 in how radiofrequency works within call detail records and
16 mapping applications that are commonly used by law
17 enforcement and criminal justice practitioners. He had
18 access to the program and studied the program for over a
19 year and published a book about it. I can't tell you what
11:45:06 20 his intention or how he incorporates that into his classes
21 or even if he does.

22 Q. Well, the book wasn't about TRAX, correct?

23 A. No. The book is about interdisciplinary cybersecurity,
24 but more importantly mobile network forensics, is what the
11:45:22 25 book is about, which I'm going to say there is always a

1 chance I'm wrong, but if you're a Ph.D. as a professor at a
2 well known college, I don't think you're writing books about
3 mobile network forensics without being able to talk about
4 radiofrequency. I don't think the two are going to go
11:45:37 5 together.

6 Q. His book never describes your algorithm or breaks it
7 down, correct?

8 A. No, it does not.

9 Q. His book was published in 2019, correct?

11:45:49 10 A. That is correct.

11 Q. And he would have had access to the program you said
12 for a year, so it would have been 2018 or earlier, correct?

13 A. Correct. He had access to the program. I also had
14 multiple phone calls with him. I discussed a lot of
11:46:07 15 different information with him. At that time, we were
16 actually supporting the update that we pushed later that
17 year externally, we actually had that algorithm developed
18 and were using it internally for further testing. We also
19 discussed some different things about that.

11:46:23 20 Q. But that's not the program he was using?

21 A. Well, he was using TRAX, but he has all of the
22 underlying data about how TRAX works. We did have very
23 specific conversations about how the ranging is used.

24 Q. So since the software has been updated, there has not
11:46:56 25 been any scientific peer review write-ups about it?

1 A. I think you are going to have to determine the
2 scientific peer review. In my opinion, when you have a
3 subject matter expert in this field who does a peer review
4 of our program for court purposes, I absolutely think that
11:47:17 5 could qualify, because you have subject matter experts who
6 are going in looking at the accuracy, they are looking at
7 the corroborative data I've spoken about. A lot of times
8 they're looking at drive test. They write a report, and
9 there is probably even another layer of challenge for them
11:47:31 10 is that they have to present that report in a court of law
11 and make sure that they are meeting all of scientific
12 standards that have been spelled out. And that's been done
13 probably hundreds of times at this point.

14 Q. Let's go to Slide Number 14 in Dr. Jovanovic's Power
11:47:55 15 Point.

16 A. Okay, I'm there.

17 Q. Now, he testified about the location -- and really we
18 will skip ahead to Slides 15 and 16 about cell 228-501.

19 A. Correct.

11:48:11 20 Q. And he notes the difference in coordinates in latitude
21 and longitude.

22 A. Well, he brings some coordinates, but you'll notice
23 that the coordinates that he brings -- I don't know where he
24 got them from. The -- what I was explaining earlier on
11:48:32 25 direct, the screen shot on Page 15 that he is providing for

1 a cell-site list is not even the right technology for this
2 particular one. So you're right, he does show some
3 different coordinates, but I have no idea where he pulled
4 those from or how he derived at those.

11:48:52 5 Q. You testified earlier that it's very easy to confirm
6 the location of cell towers, correct?

7 A. Yes, let's do that actually. If I'm okay to publish
8 again, I can show very, very quickly how we do that.

9 Q. I would like to look at these specifically, or you can
11:49:08 10 tell me --

11 A. No, that's what I'll do.

12 Q. Let me just back up, and if the government wants to do
13 that, they can.

14 Have you confirmed the location of these cell
11:49:17 15 towers?

16 A. I have. About 15 minutes before the hearing today is
17 the first time that I saw this particular issue with Slide
18 16, and anybody can do this. The first thing I did is I
19 went in and I pulled the cell-site coordinates from 228-501,
11:49:33 20 which I have confirmed is in our database, it's been there
21 since 2016, we have seen it in 32 different uploads. I put
22 those coordinates into Google Earth, and zoomed in, and sure
23 enough, there is a cell-site there. I can go into street
24 view and see the arrangement of that cell-site. And by
11:49:49 25 arrangement, I mean the direction the sectors are pointing,

1 and that also matches what is in our tower database. I am
2 100 -- I am not quite there yet.

3 This is the one time I'll change my testimony where
4 I say I'm typically not going to go a hundred percent. I'm
11:50:07 5 100 percent sure that tower 228-501 for the Verizon LTE
6 network is located exactly where we put it on Slide 17, that
7 the latitude and longitude is accurate, and that I have
8 visually actually identified that tower on the ground
9 through street view.

11:50:41 10 MR. TILTON: May I have one moment, please, your
11 Honor?

12 THE COURT: Yes.

13 (Pause in proceedings.)

14 MR. TILTON: Nothing else. Thank you.

11:50:52 15 THE COURT: Miss Sanford.

16 MS. SANFORD: Nothing further. Thank you, your
17 Honor.

18 THE COURT: All right. Thank you.

19 Any other witnesses, Ms. Sanford.

11:51:01 20 MS. SANFORD: No. Thank you, your Honor.

21 THE COURT: Mr. Tilton, any other proofs?

22 MR. TILTON: One moment, please, your Honor.

23 (Pause in proceedings.)

24 MR. TILTON: Your Honor, I would like to briefly
11:51:20 25 recall Dr. Jovanovic.

1 THE COURT: Certainly.

2 REDIRECT EXAMINATION

3 BY MR. TILTON:

4 Q. Good morning again, Dr. Jovanovic.

11:51:36 5 A. Good morning.

6 Q. You have heard Mr. Ray testify?

7 A. I did.

8 Q. And let's start with the locations and Cell
9 Number 228-501. Did you agree with his testimony?

11:52:02 10 A. Did I agree what? I didn't hear, sorry.

11 Q. Did you agree with his testimony?

12 A. Firstly, no. Let's start first Page 15 that Excel
13 snapshot of the cell-site table provided by Verizon with the
14 call records file in this case. Filtered for all cites with
11:52:38 15 Number 501, and there is no cell 501 with LT equipment by
16 Ericsson in that cell-site.

17 Mr. Ray testified that he actually uses some other
18 cell-site table, which I don't know where it comes from,
19 what is in there. I can't review it. What I am saying is
11:53:09 20 that he is putting LT site by Ericsson on the proper
21 location that doesn't exist in Verizon cell-site table. And
22 furthermore, he is putting it at the location that's not in
23 Verizon cell-site table.

24 If you're uploading the cell-site tables from the
11:53:30 25 Verizon, it would be on the same location, unless there is

1 some grounding error or you change it manually. I believe
2 that your other testimony in this case and other cases, it's
3 always emphasized that everything is done automatically
4 without any human intervention. I cannot see how this
11:53:56 5 sector could have been as presented in TRAX without some
6 human intervention. If there was human intervention, I
7 would expect that to be indicated somewhere to the Court.

8 And again, proprietary site table was mentioned, 32
9 times upload and stuff like that. What is that site table,
11:54:24 10 why it wasn't disclosed? Those are the questions I had on
11 that particular part of the testimony by Mr. Ray.

12 Q. During Mr. Ray's testimony, he discussed the, I think
13 the currentness of your industry knowledge. Could you --

14 A. Okay.

11:54:50 15 Q. Could you discuss whether your testimony is -- meets
16 current technology standards?

17 A. First, we are talking about radiofrequency propagation,
18 which is my specialty. We are not talking about LTE
19 radiofrequency waves propagate the same way no matter what
11:55:20 20 the technology is. It's through what Mr. Ray said that now
21 people are putting many more cells and the coverage is
22 different and networks are more dense and all of that, but
23 that doesn't change anything in terms of the RF propagation.
24 And I am actually quite familiar with LT technology itself.
11:55:45 25 I, throughout specifications for the software simulator for

1 LTE that Verizon was using in their propagation prediction
2 tool. I don't know I wrote the specification. I'm not sure
3 what they did with it after that. That was about the time I
4 was leaving Newfield, which was 2017 probably.

11:56:18 5 Can I make some comments myself.

6 Q. Go ahead.

7 MR. McGRAW: I mean I would object to any narrative
8 from the witness, your Honor. There needs to be a question.

9 THE COURT: Ask a question, Mr. Tilton.

11:56:29 10 BY MR. TILTON:

11 Q. Dr. Jovanovic, did you find any other inaccuracies in
12 Mr. Ray's testimony?

13 A. Okay. I found several. First, for the record under
14 oath, I never used a horizontal antenna pattern to depict
11:56:53 15 the coverage of the sector. He's repeatedly stating that in
16 the Clayton case, you have the Clayton case report, please
17 find where that is, number, figure number, page number or
18 anything like that. There is not no such utterance in the
19 Clayton report, nor in anything I have done. In Clayton
11:57:18 20 report, there is the depiction of hand-off area which is not
21 amoeba-shaped. It is pie based on the analysis in the
22 appendix of the angular distance, and based on the serious
23 due diligence in order to estimate most likely coverage
24 range.

11:57:45 25 TDOA, I believe that Mr. Ray is not well informed.

1 I can pull up the book or the copy of the book, electronic
2 copy of the book where he can see that if you're drawing
3 circles around a cell-site, time of arrival, time difference
4 of arrival is used in the CGMA technology where all of those
11:58:23 5 measure time differences, and then based on that network
6 based stations calculate time of arrivals for them.

7 Whenever you're drawing circles, it's time of arrival. When
8 you use time differences to calculate time of arrivals, you
9 can draw circle, but it's still time of arrival.

11:58:54 10 I can also comment about the estimate size. Proper
11 measure of the accuracy of the depiction cannot just take
12 the probability that you are in the area marked. It has to
13 take into account the chance that you're showing something
14 where mobile cannot be. Mr. Ray can achieve a hundred
11:59:31 15 percent accuracy of his estimates if he draws 100 mile
16 circle around each of his sites. Phone is certainly going
17 to be within 100 miles. He can go 50 miles, that would be
18 99.9. If he drove ten miles -- just by making the estimate
19 huge, you cannot -- you increase the probability that you're
12:00:00 20 leaving the area, but you're showing meaningless results,
21 right?

22 There was also a question where he was showing how
23 the coverage in Google Earth, how the coverage to the
24 southeast of one site was related to the coverages in the
12:00:28 25 area -- to the south in the area. I'm not sure I could

1 discern if that was the same case that I showed in Slides 9
2 and 10. The areas were red, so it might have been Verizon,
3 I'm not sure. But in Slides 32 through 38, you have
4 coverage areas around that site which miraculously increase
12:01:00 5 its rate range 2.5 times as related to the old neighboring
6 cells in the file that I could find. And you will see a lot
7 of cells to the southwest, and you'll see again impossible
8 overlap in coverages. That doesn't happen.

9 I understand Mr. Ray has spent years of experience
12:01:24 10 of finding dead bodies and stuff like that. I have 25 years
11 experience of utilizing drive test data in all sorts of
12 capacities in crime court in Lucent, in Newfield Wireless.
13 These things that he is showing don't happen in the field
14 the way they are showing. I have a lot of firsthand
12:01:48 15 experience with drive test measurements, with propagation
16 prediction tools, with all of that stuff. It just doesn't
17 happen this way.

18 Again, you can show the sector, you can draw 50
19 miles around it, you can be 100 percent accurate in your
12:02:05 20 presentation, but that's misleading.

21 Q. Thank you.

22 Do you have the affidavit from the Clayton case in
23 front of you?

24 A. I do.

12:02:20 25 Q. And this is Defense Exhibit OO. And did you prepare

1 that affidavit?

2 A. Yes, that's mine, yeah.

3 MR. TILTON: Your Honor, I move admission of
4 Exhibit OO?

12:02:38 5 THE COURT: Any objection?

6 MR. McGRAW: I'm not sure what the relevance of
7 that affidavit is to this proceeding, your Honor.

8 THE COURT: Mr. Tilton.

9 MR. TILTON: Your Honor, Dr. Jovanovic has referred
12:02:48 10 to that affidavit. I don't intend to ask any questions at
11 this point, but it's been referenced, I believe by Mr. Ray
12 as well, and they have talked about the Clayton case and the
13 Merritt case similar to Government Exhibit 100. So I think
14 just for a clear record having that affidavit is part of
12:03:05 15 this record, would help clarify if there are any questions
16 somewhere down the line.

17 THE COURT: Would help clarify what?

18 MR. TILTON: What Dr. Jovanovic is specifically
19 talking about or testifying about.

12:03:21 20 THE COURT: Okay.

21 I'll receive the exhibit. Go ahead.

22 MR. TILTON: I have no additional questions, your
23 Honor.

24 THE COURT: Ms. Sanford or Mr. McGraw?

12:03:31 25 MR. McGRAW: No questions, your Honor.

1 THE COURT: All right. Thank you.

2 Any further proofs, Mr. Tilton?

3 MR. TILTON: No, your Honor, thank you.

4 THE COURT: Does the government have anything else?

12:03:42 5 MS. SANFORD: No, thank you.

6 THE COURT: All right. Thank you.

7 I can take argument now if you want to do oral

8 argument at this point. And then we will --

9 MS. SANFORD: The government is prepared.

12:03:57 10 MR. TILTON: Yes, your Honor, that's fine.

11 THE COURT: Okay.

12 Mr. Ray and Dr. Jovanovic, you're excused with the

13 Court's thanks.

14 DR. JOVANOVIC: Thank you.

12:04:17 15 MR. RAY: Thank you, sir.

16 (Zoom call disconnected.)

17 THE COURT: Miss Sanford.

18 MS. SANFORD: Thank you, your Honor.

19 The government contends that pursuant to the

12:04:31 20 standards outlined under Daubert, this evidence is

21 admissible at trial. What Exhibit 25 shows is cell-site

22 location information, wifi data, and RTT sometimes called

23 TDOA data of various phones associated with this case. And

24 it's mapped here by TRAX. And the TRAX software is, we

12:04:57 25 contend, valid and reliable. It uses an algorithm that was

1 very clearly outlined for the Court that's testable, that
2 has been peer reviewed, that could be replicated, and that
3 can be tested. The accuracy of the call hand-off range data
4 can be tested against internal data such as the wifi data
12:05:20 5 and the RTT data that we find in these devices in this case
6 and they have seen in other cases, and it can be tested
7 against external data, such as drive testing.

8 I think there were two things that Dr. Jovanovic
9 said that are important to analyzing this issue. First, he
12:05:37 10 agreed that this sort of data can be mapped. Now, he
11 thought that it needed to consider the radiofrequency
12 pattern, the antenna height, the strength, the topography,
13 whether it's urban or rural, etcetera. And what Mr. Ray
14 said is that although they don't specifically look at all of
12:05:54 15 those things for each cell-site in TRAX, those things are
16 accounted for by the error rate.

17 And Dr. Jovanovic said that drive test data would
18 be a good way to test the accuracy of this sort of mapping
19 program. And TRAX uses drive test data to check against its
12:06:11 20 database to make sure that it is accurate, and they have
21 done that. So I do think that this is sufficiently reliable
22 for the Court to admit it.

23 And it's relevant and probative here. If we look
24 at, for instance, Government's Exhibit 25S, we are showing a
12:06:26 25 cell-site location -- cell-site location for a phone call

1 that Dan Errico is making. This is a pretty large area
2 that's covered here. It goes from Leonard to the north
3 almost to Wealthy to the south, it goes beyond College to
4 the west and Fuller to the east. This covers many, many
12:06:45 5 blocks in the City of Grand Rapids. And the government
6 isn't trying to pinpoint where anybody is inside of this
7 particular area. But what is relevant about this exhibit is
8 in 25S we see the cell tower that Dan Errico was using to
9 make a call to a phone number that belongs to Mustafa
12:07:02 10 Reynolds. And in 25T, we see that Mustafa Reynolds is
11 getting that call on that exact same cell tower. We think
12 that sort of information is relevant to the jury to
13 understand and corroborate witness testimony when Dan Errico
14 says he called Mr. Reynolds and they met, and there was a
12:07:19 15 drug transaction, this is corroborating of other evidence
16 that the jury is going to hear. It's relevant, it's
17 probative, it's valid, it's reliable, it's been peer
18 reviewed, it can be tested. We think that Government's
19 Exhibits 25 should be admitted at trial.

12:07:35 20 Thank you.

21 THE COURT: Mr. Tilton.

22 MR. TILTON: Thank you, your Honor.

23 Your Honor, the defense recently filed in ECF 109,
24 a reply to both the Daubert motion and to the Rule 16
12:07:58 25 motion, and I'm going to rely largely on that, because I

1 think, based on the testimony here today, our arguments are
2 still consistent with what we made in that motion.

3 What I'll add today, a couple things: Number 1,
4 Dr. Jovanovic is someone whose credentials are, I think,
12:08:23 5 very appropriate to review the TRAX software and make a
6 determination of whether or not it meets the Daubert
7 standard. He is someone who has U.S. patents in hand-off
8 technology, which is exactly what TRAX advertises itself as
9 being able to do. He has written technical papers and he
12:08:48 10 has worked -- over 30 technical papers, and he has worked in
11 this exact field for well over 30 years, has a Ph.D. in
12 engineering, and has held both leadership and development
13 positions in the industry. And so I think his affidavit
14 speaks very loudly as to why TRAX is not reliable. It's the
12:09:17 15 only company that uses this type of theory and it hasn't
16 been peer reviewed.

17 Mr. Ray talked about peer review in a nonscientific
18 sense, and in a scientific sense. He had placed a number of
19 papers on his website and several individuals, including
12:09:42 20 Dr. Jovanovic, none of which support his theory or
21 technology. He has listed one person both between his
22 testimony today and his testimony in July who he said wrote
23 a peer-reviewed book about the technology, a Professor
24 Sharevski from DePaul. But as he testified today, that book
12:10:09 25 does not address the TRAX algorithm, and it addresses the

1 TRAX software that was used in 2019 prior to this update in
2 2020 when there were significant changes that were made. So
3 since these significant changes that were made that have
4 supposedly increased the accuracy about 10 percent, there
12:10:34 5 hasn't been a single person who has peer reviewed that, not
6 that the government has pointed to, not that Mr. Ray has
7 pointed to. So I think --

8 THE COURT: Isn't the record fairly clear that the
9 updated software helps to exculpate as opposed to the other
12:10:52 10 way around?

11 MR. TILTON: Well, it all depends on the
12 circumstances and --

13 THE COURT: Based on the exhibit that I saw, the
14 adjustment based on the new software expanded the area where
12:11:10 15 a certain call was being made. That doesn't help the
16 government, does it?

17 MR. TILTON: Well, actually I think if you're
18 referring to Slides 10 and 11, it potentially could. We are
19 talking about an area in -- an urban area in Grand Rapids.
12:11:32 20 This call from that ends, the phone number that ends 0111,
21 or a text was from one of the alleged victims in this case,
22 and so I think changing and increasing the size of where
23 that person was could be helpful, could be exculpatory, but
24 it may not be helpful to the defense. But I think more
12:11:56 25 importantly --

1 THE COURT: Are you suggesting the update of the
2 software which, based on the testimony, contained more
3 information, more inputs, is less accurate than the software
4 before April of 2020?

12:12:12 5 MR. TILTON: Well, I don't think that we can -- I
6 don't think we can say that, because it hasn't been peer
7 reviewed. There was one instance of what he is calling peer
8 review, which I don't think meets the standard of the older
9 software, and no one has peer reviewed it after April of
12:12:31 10 2020. So I don't think that we can say. And it's also gone
11 to a different sort of method of mapping, so I don't think
12 I'm in a position to say, and I don't know that anyone is in
13 a position to say whether it's more accurate or less
14 accurate because it's changed. It wasn't -- didn't go
12:12:49 15 through a rigorous peer review prior to the update and, from
16 what Mr. Ray has said, it definitely hasn't since the
17 update.

18 THE COURT: So every time there is a software
19 update, there must be a rush for a peer review article
12:13:07 20 before the software makes -- passes through the Daubert
21 test?

22 MR. TILTON: I think that if the software changes
23 the method in which it is outputting data, then yeah. And
24 but more importantly, I don't think that even the
12:13:26 25 pre-updated software went through rigorous peer review. The

1 book doesn't talk about specifically the algorithm here,
2 it's a short section in a long book about a lot of different
3 products.

4 THE COURT: All right. Go ahead.

12:13:43 5 MR. TILTON: And I think also looking at the
6 background of Mr. Ray and Dr. Jovanovic, Mr. Ray isn't
7 someone -- he has maybe job experience, but he doesn't have
8 any advanced degree, he doesn't have a Bachelor's, he
9 doesn't have a Ph.D.

12:14:03 10 THE COURT: Mr. Ray and Dr. Jovanovic are both
11 imminently qualified. I'm not going to accept an argument
12 that Mr. Ray is not qualified. So go ahead, you can -- I'll
13 cut that one short right away.

14 MR. TILTON: Well, I think then we look at the
12:14:19 15 known error rate. And again, that error rate hasn't been
16 tested, hasn't been peer reviewed. It was unclear to me
17 what the error rate was prior to the software update. And
18 while he is saying it's a 95 percent rate nationally, there
19 is nothing -- he didn't give a specific as far as what the
12:14:42 20 accuracy rate would be in this instance where there wasn't
21 corroboration.

22 THE COURT: I don't have a counter number, though,
23 correct?

24 MR. TILTON: You don't have a counter number, and I
12:14:54 25 think that goes, it circles back to the peer review -- to

1 the peer review part of this where, if it hasn't been
2 reviewed, if the scientific -- larger scientific community
3 hasn't looked at it, it's difficult to know how accurate it
4 is.

12:15:09 5 THE COURT: Based on the 95 to 98 percent number,
6 do you think -- which is the only number I have in this
7 record, does that meet the Gissantaner test on reliability?

8 MR. TILTON: Well, I think it would actually have
9 to be proven. And what Dr. Jovanovic said is it's not
12:15:32 10 correct, and he doesn't believe it would be anywhere near
11 that rate.

12 THE COURT: All right. But what am I left with
13 with Dr. Jovanovic's testimony regarding reliability? I
14 have an assertion that 95 to 98 is not accurate. But it
12:15:50 15 could be 93, based on what I heard from Dr. Jovanovic, it
16 could be 10, but aren't I left to guess based on this
17 record?

18 MR. TILTON: Well, I think just because Mr. Ray
19 comes in and says it's 95 to 98 percent, but doesn't provide
12:16:08 20 any backup data or studies to say this is correct. He
21 didn't provide any internal studies. He's talked a lot
22 about different drive tests that they have done. He's
23 talked a lot about their own internal data. I think
24 largely, and he didn't delineate what that looked like
12:16:27 25 before April 2020 and what it looks like since, after April

1 2020, but he didn't even provide external statistics to say
2 this is how he got it. What I heard was anecdotal. We have
3 done a lot of testing, we have done a lot of drive testing,
4 but we haven't actually seen the numerical support for what
12:16:46 5 he is saying, whether internally or externally through some
6 sort of peer review. I think there are a lot of open
7 questions as to how reliable is this. Is it five percent,
8 is it zero percent, is it 90-something percent, but that
9 burden is on the government to show that it meets the
12:17:05 10 Daubert test, and I don't think that it's gotten through
11 that gate.

12 THE COURT: All right. I understand the argument.
13 Go ahead.

14 MR. TILTON: May I have one moment, please, your
12:17:34 15 Honor?

16 THE COURT: Sure.

17 (Pause in proceedings.)

18 MR. TILTON: Your Honor, I just want to point out
19 as far as this accuracy rate, I mean part of this is how are
12:18:18 20 we able to confirm it. And this kind of goes back to our --
21 I don't know if the Court wants me to address the Rule 16
22 motion as well at this point, but I think it does kind of
23 dovetail into that in that if there's an expectation that we
24 should provide some sort of accuracy rate and do our own
12:18:38 25 testing. Part of that is the government has to provide us

1 with that information. And so we have had, we have had the
2 KMZ files now for about a month, but at the same time, I
3 don't think that's enough time to go out and validate this
4 software that they intend to use at trial. So I think
12:19:00 5 that -- and we have had even, you know, less time with the
6 updated KMZ files that were run through the April 2020
7 updates, we have had those for less than a month. And so I
8 think if we are looking at how much time do we have or what
9 can we come to present as far as an accuracy rate, we just,
12:19:21 10 you know, Dr. Jovanovic thought it might take him a year,
11 but we haven't even had these files really for longer than a
12 month at the most.

13 THE COURT: All right. Fair enough. I understand.
14 What is the remedy for that?

12:19:40 15 MR. TILTON: Well, I think if the Court's going to
16 look at -- I guess there are couple remedies. One is just
17 to exclude, because we have had, you know, here we are, when
18 we came in on July 23rd, the trial had already been delayed
19 because the government notified us the day before the final
12:20:03 20 pretrial or night before the final pretrial that Detective
21 Heikkila was an expert, and provided us with some of the
22 maps produced by TRAX. But now, you know, we are at this
23 point here where we have received in the last month or so
24 100,000 data point that have gone through TRAX. And so I
12:20:24 25 think at this point, I mean the Court's remedies are, you

1 know, do we get more time if the Court's going to rely on
2 the accuracy rate to try to come up with our own accuracy
3 rate, which I think would take a significant amount of time,
4 or as a remedy to exclude it. And it's not -- again, it's
12:20:46 5 not let's go back to the same point, but since it's not peer
6 reviewed, we have to take Sy Ray's word for the accuracy
7 number at this point. And to go out and do our own for
8 testing or attempt to do our own testing would, I think,
9 take significant time.

12:21:04 10 THE COURT: Well, you've had two opportunities to
11 cross examine Mr. Ray on his accuracy rate estimates, and
12 I've heard multiple answers from Mr. Ray regarding your
13 cross examination on that issue, and that's what I have in
14 the record. There is no contrary number in the record that
12:21:35 15 would undermine that estimate is there.

16 MR. TILTON: Well, there is not a number
17 specifically, but there is Dr. Jovanovic, both his affidavit
18 and testimony, to say that it's not reliable. And I think
19 in response to Mr. McGraw's question about determining
12:21:52 20 accuracy, he said it would take about a year to do that.

21 I mean I don't think it's a small task when Mr. Ray
22 is talking about tens of millions of data points that they
23 have supposedly gone through and used to validate their
24 program, but we just don't have it. And as far as I know,
12:22:12 25 no one in the broader scientific community has been provided

1 with it or has done a comprehensive peer review. And even
2 to say that Dr. Sharevski reviewed it and put it in his
3 book, there is nothing in that book to suggest he broke the
4 algorithm down and peer reviewed it in the scientific way
12:22:35 5 that I think Gissantner contemplates.

6 THE COURT: Did I hear Dr. Sharevski's name for the
7 first time this morning?

8 MR. TILTON: He was mentioned during the last
9 hearing.

12:22:47 10 THE COURT: Okay.

11 MR. TILTON: And I did reach out to him on multiple
12 occasions by email, and I called him as well to ask his
13 position, and I never received a response.

14 THE COURT: Is the -- Is the applicable piece of
12:23:04 15 the book in the record here?

16 MS. SANFORD: It is not, your Honor. We do not
17 have a copy of that.

18 MR. TILTON: We have the book. We could -- and I
19 actually I think we have that -- it's only a couple pages, I
12:23:18 20 think we have it scanned, so we could provide it, we could
21 file it or however the Court wants to provide it.

22 THE COURT: I take your point about peer review,
23 and we have talked peer review a lot. Mr. Ray talks about
24 Dr. Sharevski's -- I'm sure I'm butchering the name, but
12:23:33 25 about his review. And I think I need to read that in order

1 to come to some conclusion about the peer review prong of
2 the test that Judge Sutton gave me in Gissantner, so if you
3 could provide that to the government and send a copy to me,
4 I would appreciate it.

12:23:51 5 MR. TILTON: Yes, your Honor.

6 And your Honor, I guess I wanted to bring up one
7 additional piece of information by proffer, especially if we
8 are going to file something, because it's likely to be filed
9 in a separate case. I can give you, the Court, that case
10 number, but in what I do think is important to at least
11 bring up at this point is -- so we are talking here about a
12 closed, what I would call the closed cell horizontal plane,
13 so to define area where a cell phone is supposedly in
14 relation to a cell tower. And that is -- the government's
15 using that theory in this case. In a separate case in the
16 same district, I think it's important to note that the
17 government recently withdrew Detective Heikkila and the TRAX
18 program as an expert and notified that it would be using a
19 separate FBI's expert and the FBI cast program and using the
20 wedge theory. So I think with two different cases at the --
21 pending at the same time, the second one is set for trial in
22 October in front of Judge Jarbou, the government, same U.S.
23 Attorney's Office is essentially pushing two different cell
24 phone mapping theories that I do think contradict each
12:25:09 25 other. And if we are going to file anything additional, I

1 would potentially add that to the filing.

2 THE COURT: Okay. Go ahead.

3 MR. TILTON: And that's really all I have on the
4 Daubert at this point, your Honor.

12:25:26 5 THE COURT: All right. Thank you.

6 Mr. Tilton, couple more questions. Implicitly,
7 given the fact that you've made reference to the fact that
8 you've only had certain pieces of the data for a limited
9 period of time, what is the -- are you asking for more time.

12:25:54 10 MR. TILTON: Well, your Honor, I think if -- I
11 guess that is sort of a two-part question. If the Court --

12 THE COURT: I didn't think it was a two-part
13 question, but go ahead.

14 MR. TILTON: Two-part answer, I should say.

12:26:08 15 If the Court is contemplating allowing the TRAX
16 software to come in and to be used by the government, I
17 think that the difficulty that we are having is we have had
18 a time to review the first 50,000 data points. We have
19 received a second 50,000 which the government provided after
12:26:31 20 running the program through TRAX again. And so I would
21 likely want -- I would want some more time to compare those
22 two together. I mean I was able to quickly find that
23 difference in horizontal plane or amoeba size from the 20th
24 that Dr. Jovanovic used in his Power Point, but I don't know
12:26:57 25 how many more are out there and how many would change

1 positions.

2 THE COURT: You've seen 50,000, but you're looking
3 at another 50,000 that you haven't had a chance to analyze;
4 is that what I hear you saying?

12:27:10 5 MR. TILTON: I think in relation to each other. I
6 think now, having some, having an opportunity to work
7 through TRAX, I don't know that we need as much time as I
8 originally thought when I first received 50,000 data points,
9 but it is --

12:27:27 10 THE COURT: You mean you didn't sit down with
11 pencil and paper and work it out?

12 MR. TILTON: It caused my computer to crash a
13 number of times.

14 If the Court is contemplating going down that road
12:27:38 15 or would want supplemental briefing on this issue, then we
16 would want additional time prior to starting trial on
17 Monday.

18 THE COURT: All right. Well, what do you make of
19 the fact that, based on Mr. Ray's testimony, no attack on
12:27:56 20 this software has been successful in terms of a court
21 barring, barring its use, and specifically the Clayton case
22 where apparently the doctor's opinions were before the Court
23 and the State -- the highest State Appellate Court of New
24 York said the trial judge got it right when he allowed the
12:28:28 25 evidence in? What do you make of the New York case where

1 Dr. Jovanovic's documentation was in the record; and
2 secondly, Mr. Ray's testimony that there hasn't been a Court
3 that's disallowed it?

4 MR. TILTON: Well, I think there is a couple -- let
12:28:52 5 me start with the Clayton case. It's my understanding that
6 Dr. Jovanovic came in after the trial when it was going
7 through some sort of appeal stage.

8 THE COURT: Okay.

9 MR. TILTON: So it wasn't through a Daubert or Frye
12:29:05 10 hearing.

11 THE COURT: So Dr. Jovanovic's opinion was not
12 before the trial judge?

13 MR. TILTON: Correct. That's my understanding.

14 THE COURT: And he came in during the appellate
12:29:17 15 process and apparently provided some information that got
16 into the record that the Appellate Courts of the State of
17 New York reviewed?

18 MR. TILTON: Correct.

19 THE COURT: Okay.

12:29:26 20 MR. TILTON: And he never --

21 THE COURT: Thank you for that clarification. I
22 didn't realize that.

23 MR. TILTON: So he never testified.

24 You know, it's I think, and we do -- we did cite in
12:29:36 25 our brief a case out of Massachusetts. It's on Page 17, the

1 Commonwealth vs. Carrasquillo, and I think I said that
2 wrong. It's C-a-r-r-a-s-q-u-i-l-l-o. There was a Daubert
3 hearing, pretty significant Daubert hearing, as I understand
4 it, that lasted more than one day, and in that case, the
12:30:03 5 judge disallowed the information.

6 THE COURT: All right. I've read that opinion, and
7 it would appear to the Court that the prosecuting authority
8 did a lousy job presenting their case, and that was my --
9 that was my bottom line, because the opinion continues to
12:30:24 10 cite absences in the record which, you know, looked curable
11 to me based on my read. Now, that's all I've done is I've
12 just read the appellate opinion, but that was the conclusion
13 I came back with.

14 MR. TILTON: Well, I think that sort of goes to, at
12:30:45 15 least my interpretation of, on the defense side or with some
16 sort of level of experts as far as why this information is
17 often not challenged. Because I think that when you put --
18 I think the thing that this TRAX software, I think, really
19 has going for it is it's very user friendly. And you upload
12:31:10 20 all of the CDRs and it spits out these maps within about ten
21 minutes. And I think -- my interpretation in talking to
22 different sort of digital forensic experts is that the cell
23 tower sort of analysis is such a higher level that there are
24 fewer people who are qualified. And I talked to several
12:31:34 25 people about this program and they liked the simplicity of

1 it. And I think that it looks, I think, more accurate than
2 I think it is until you talk to someone who has a background
3 in radiofrequency and cellular geolocations like
4 Dr. Jovanovic. And that was when I talked to a couple
12:32:03 5 different people who provide services on things like
6 Cellebrite. This was above and beyond them, and so I think
7 that is the initial problem that I had when this was, when
8 the TRAX program was brought to me, is there is not a lot of
9 familiarity with it, and some people look at it and think
12:32:23 10 well, it's simplifies a very difficult area and it must be
11 accurate. But that ultimately, when I talked to
12 Dr. Jovanovic who has experience, who has experience in this
13 very specific field, he -- and I talked to several other
14 attorneys who had challenged or were in the process of
12:32:45 15 challenging this information, I got a much better
16 understanding of it, and I think that it doesn't get
17 challenged because people don't necessarily understand it
18 all that well.

19 THE COURT: Federal defenders across the country
12:33:01 20 don't understand it?

21 MR. TILTON: It was also hard. We sent out an
22 email to our federal defender help desk.

23 THE COURT: An E blast?

24 MR. TILTON: Yes, and we received very limited
12:33:13 25 information about the use of this in other cases. That's

1 not to say that it's not being used, but we received very
2 little feedback that people were not familiar with it. I
3 also sent it to our panel on the local bar and asked people
4 if they were familiar with this program, and there was very
12:33:32 5 limited familiarity with it. So I think that's part of it
6 as well. It's a newer program.

7 THE COURT: All right. Thank you. Did you have
8 anything else at the moment, Mr. Tilton? I'll come back to
9 you if you want.

12:33:43 10 MR. TILTON: Not at the moment, your Honor. Thank
11 you.

12 THE COURT: Thank you.

13 Ms. Sanford.

14 MS. SANFORD: Thank you, your Honor.

12:33:48 15 THE COURT: What result from the use of the TRAX
16 software do you intend to introduce, if allowed? Are we
17 talking about the post 4-20 software result, or the
18 pre-April '20 software.

19 MS. SANFORD: We are talking about introducing maps
12:34:11 20 generated after the software update that show general
21 locations where cell phone might be based on cell-site
22 location information. And I wanted to highlight for the
23 Court the Hill case out of the Seventh Circuit, 18 F.3rd
24 289, which says that historical cell-site analysis can show
12:34:36 25 with sufficient reliability that a phone was in a general

1 area, especially a well-populated one, and that's all we are
2 trying to do here.

3 And that Court went on to point out that although
4 there is not a mathematical error rate, the technique has
12:34:47 5 been subjected to publication and peer criticism, if not
6 peer review.

7 We aren't trying to say, and I think a lot of the
8 cases critical of cell-site location information are the
9 idea we are trying to say someone is in a precise location
12:35:02 10 based on a tower they are hitting off of. We aren't saying
11 that. But we are saying there are important correlations
12 for instance, that when Mr. Errico and the defendant are on
13 the phone with each other, they are both hitting on the same
14 tower that covers the same part of the city, but that's
12:35:15 15 important to corroborate what some of our witnesses will
16 testify to. But we are never going to use cell-site
17 location information to exactly pinpoint anyone's location.

18 I listed a number of cases in our response that,
19 from various circuits admitting this kind of evidence. And
12:35:34 20 I think that there are multiple ways this could be mapped.
21 It could be mapped the way TRAX does it with a horizontal
22 plane. It could be mapped with a cone shape, as has been
23 done in other cases, but the fact that someone could map it
24 differently or someone could draw different conclusions
12:35:50 25 about what the coverage area is for a cell-site goes to the

1 weight of the evidence, not the admissibility. That's
2 subject to cross. They can produce their own witnesses, say
3 they would draw different conclusions. I don't think it
4 prevents this evidence from coming in because it could be
12:36:03 5 done differently or because they disagree with the
6 conclusions our experts reach.

7 THE COURT: What is your reaction to Mr. Tilton's
8 request for more time?

9 MS. SANFORD: The government would very much like
12:36:16 10 the case to proceed next week. We have provided all of the
11 data points they have had throughout. I know he is talking
12 about 50,000 data points before and 50,000 data points since
13 the software update, but that's three months of data for
14 cell phones, the two decedents, the defendant and
12:36:34 15 Mr. Errico. And three months of data isn't necessarily
16 relevant to this case. What is relevant to this case is a
17 much shorter time span of about the day when these drugs
18 deals occurred, and really the 12 hours. And we have
19 provided a copy of our Exhibit 25, both with the mapping
12:36:47 20 done before software update and after, and the only change
21 in anything that we would show the jury is the one change
22 that's already been pointed out, Slides 10 and 11 in
23 Dr. Jovanovic's presentation.

24 THE COURT: That is the only change?

12:37:01 25 MS. SANFORD: That is the only cell-site location

1 -- cell-site that changed in the exhibits that we will use.

2 THE COURT: And it got broader?

3 MS. SANFORD: Yes.

4 THE COURT: And help me with the relevance of those
12:37:14 5 two slides.

6 MS. SANFORD: Those are calls that one of the
7 decedents, B.D., made, and so it shows roughly where he was
8 while he was making those calls.

9 THE COURT: To?

12:37:28 10 MS. SANFORD: I think it was Dan Errico, who acted
11 as a middleman in obtaining the heroin/fentanyl for him.

12 THE COURT: All right. So it was only that one?

13 MS. SANFORD: That was the only change in the map.

14 THE COURT: The only change?

12:37:43 15 MS. SANFORD: Yes.

16 THE COURT: Okay. All right. Thank you.

17 Go ahead, Mr. Tilton.

18 From your review so far, did you see any other
19 changes? I mean the government apparently is going to go
12:37:59 20 with the updated software. Did you see any other changes
21 other than the ones that -- other than the one Ms. Sanford
22 just referred to?

23 MR. TILTON: So I have so far not seen any more,
24 but I haven't -- so with each device, they are, I don't know
12:38:18 25 if you recall, I think we went through them a little bit on

1 the 23rd. There's a different file that's created for,
2 generally I think it's at least three per phone, so it will
3 be calls, it will be texts, and it will be data. And so
4 there can -- I can't say for certain that we are not going
12:38:41 5 to find more on the 20th, more variations. I mean I think
6 any communication between Dan Errico and either of the
7 decedents is, the night of the 20th, is a very important
8 communication, especially because I think the government's
9 case is going to be that Dan Errico gave B.D. the substances
12:39:10 10 that killed him. That, you know, the government's case will
11 be they came from Mr. Reynolds, so it's a significant
12 communication anytime there is that kind of contact, and
13 really any contact or location that night, I think, is very
14 important.

12:39:25 15 What I just -- The other thing I wanted to briefly
16 point out is there are different types -- when Ms. Sanford
17 was talking about Hill and different types of cell phone
18 evidence that's been allowed in in different courts, I do
19 think it's important to talk about -- a little bit about the
12:39:43 20 different pies and wedges, and in this case the horizontal
21 plane. And the reason is because when Dr. Jovanovic talks
22 about sort of the pie, the triangle that shoots off of the
23 cell tower, it's my understanding he is talking about an
24 undefined sort of top of the piece of that pie. So it kind
12:40:02 25 of shoots out until the antenna loses its radiofrequency.

1 There have been some courts that have looked at sort of a
2 cap on that pie, and that would be closer to what we are
3 talking about here, which defines the area more small -- in
4 a smaller sense than that open cone or wedge shape.

12:40:28 5 So I think when we look at the overall caselaw,
6 it's important to focus on cases where the area is more
7 defined as opposed to sort of just cell-site location in a
8 broader sense.

9 THE COURT: Okay. Mr. Tilton, let me ask another
12:40:51 10 question. I'm not going to hold this to you, but it's a
11 concern that I have in terms of a presentation of this case
12 to the jury. It was very difficult to hear Dr. Jovanovic
13 via the ZOOM, and I assume the court reporter was having a
14 little bit of trouble, too. I'm a little bit concerned, if
12:41:18 15 you are going to call him, whether his testimony is
16 appropriate given the technology issues and the ZOOM
17 connection there, I don't know if it was above average or
18 average or better than average, but it wasn't working for me
19 all the time in terms of some of the time when the voice got
12:41:47 20 little bit lower, it was harder to pick up, so do you have
21 any notion about, on that subject?

22 MR. TILTON: Subject to the approval of funding, it
23 would be my intent to call him, if we decide to call him, to
24 testify in person. And he lives in Indiana, so I think that
12:42:07 25 we could make that.

1 THE COURT: I thought he was in the State of
2 Washington. I saw some reference to the State of
3 Washington.

4 MR. TILTON: He did live there and he worked there.
12:42:17 5 Now at least when I've talked to him --

6 THE COURT: When I read that, I said have we got
7 this witness up at 6:00 a.m. in the morning to testify?

8 MR. TILTON: Right now he is in Indiana.

9 THE COURT: His local time to testify. Okay. So
12:42:30 10 he is in Indiana.

11 MR. TILTON: Yes.

12 THE COURT: Okay. All right. So his physical
13 availability is not going to be an issue.

14 MR. TILTON: I don't think so.

12:42:37 15 THE COURT: As far as you know.

16 MR. TILTON: Right.

17 THE COURT: Fair enough. All right. Here is what
18 I want to do. Obviously I got a lot of new information
19 today, so I'm going to give everybody the opportunity to
12:42:50 20 submit post-hearing briefs, if they want. Please limit to
21 12 to 15 pages.

22 And Mr. Tilton, I've heard your request for an
23 adjournment of the trial, but if you -- if that's still your
24 position, assuming, obviously assuming the Court's going to
12:43:16 25 allow this evidence in, and I appreciate the fact you are

1 not sure about that, but if you would address your request
2 for a delay in the trial in your papers, and that way I can
3 evaluate that. Obviously if I'm not going to allow the
4 evidence in, then that becomes moot. But if I am going to
12:43:38 5 allow the evidence in, I want you, if you would, to address
6 your request for an adjournment and why you need one, okay?

7 MR. TILTON: Thank you, your Honor.

8 THE COURT: All right.

9 Anything else from the government?

12:43:48 10 MS. SANFORD: No. Thank you, your Honor.

11 THE COURT: Mr. Tilton?

12 MR. TILTON: I guess just as far as when we submit
13 the -- obviously we are scheduled for trial Monday. Is
14 there a certain time you want that?

12:44:02 15 THE COURT: I would say first thing in the morning
16 Thursday or last thing of the day on Wednesday, either one.
17 I've got a jury -- jurors, the jury is going to be calling
18 in. When are we scheduled to start, Monday?

19 COURT CLERK: Yes.

12:44:19 20 THE COURT: So the jury starts to call in several
21 days in advance and the jury clerk likes to give them
22 guidance, so first thing in the morning Thursday at the
23 outside.

24 MR. TILTON: Thank you, your Honor.

12:44:32 25 THE COURT: Okay. All right. Thanks very much.

1 COURT CLERK: All rise, please.

2 THE COURT: You can be seated.

3 (At 12:44 p.m., proceedings concluded.)

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C E R T I F I C A T E

I, Kathleen S. Thomas, Official Court Reporter for the United States District Court for the Western District of Michigan, appointed pursuant to the provisions of Title 28, United States Code, Section 753, do hereby certify that the foregoing is a true and correct transcript of proceedings had in the within-entitled and numbered cause on the date hereinbefore set forth; and I do further certify that the foregoing transcript has been prepared by me or under my direction.

/s/

Kathleen S. Thomas, CSR-1300, RPR
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